

Creating HP Software-defined Networks

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Creating HP Software-defined Networks

Version: 7.0
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Exam A

QUESTION 1

A company has an IRF-based, 2-tier FlexFabric architecture in its data center. The company is now increasing the amount of server virtualization and also adding more redundant connections across the network infrastructure backbone. Which benefit does software-defined networking (SDN) provide for this FlexFabric solution?

- A. SDN applications can extend the virtual switches inside hosts into the control plane of multiple physical infrastructure devices.
- B. SDN can help core routing switches handle more routing table entries without sacrificing performance.
- C. SDN extends the SNMP MIBs to include MIBs for virtual switches.
- D. SDN applications can help to provision network connectivity for virtual machines and to forward traffic across complex meshes of links

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Q: What is HP's SDN strategy?

A: Virtual Application Networks represent HP's software-defined network vision. By leveraging SDN-enabled infrastructure, control plane, applications and integrated management systems HP is creating an open ecosystem to drive new innovation in networking.

Q: What is the HP Virtual Application Networks SDN Controller?

A: The HP Virtual Application Networks SDN controller is an integral part of HP's Virtual Application Networks offering. The controller acts as the central building block for an abstracted control plane in the SDN architecture.

Reference: Virtual Application Networks Overview

http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-4714ENW.pdf?jumpid=em_r1165_ww/en/large/eg/RelatedLink/Virtual_Application_Networks_Overview_FAQs/resourcefinder/Jan_2013

QUESTION 2

What are challenges when selecting traffic from UC&C soft devices for marking, in order to apply the appropriate prioritization? (Select two.)

- A. UC&C traffic uses dynamic port numbers.
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- B. UC&C traffic is not peer-to-peer
- C. UC&C traffic is routable.
- D. UC&C traffic uses well-known port numbers.
- E. UC&C traffic can share a port, mac, and VLAN combination with non-UC&C traffic.

Correct Answer: CD

Section: (none)

Explanation

Explanation/Reference:

Explanation: C: UC&C signaling can be routed through centralized UC&C infrastructure components and that all interactions.

D (not A): UC&C signaling traffic is identified using the well know transport and port numbers used by the UC&C signaling protocol.

Reference: Automating QoS

http://johnacook.files.wordpress.com/2014/03/2014_02_27_use_case.pdf (page 7, bullet # 2)

QUESTION 3

What are the addressing requirements for an HP VAN SDN Controller team?

- A. A team requires two IP addresses for each controller, plus one IP address assigned to the team.
- B. A team requires one IP address for each controller, plus one IP address assigned to the team.
- C. A team requires one IP address, and members communicate using their MAC addresses.
- D. A team requires one IP address for each controller; each is configured with the same multicast address.

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: A team requires one IP address for each controller, plus one IP address assigned to the team. If the current team manager goes down, the failover process includes keeping the team IP address active on the new team manager.

Reference: HP VAN SDN Controller Administrator Guide http://h20566.www2.hp.com/portal/site/hpsc/template.BINARYPORTLET/public/kb/docDisplay/resource.process/?spf_p.tpst=kbDocDisplay_ws_BI&spf_p.rid_kbDocDisplay=docDisplayResURL&javax.portlet.begCacheTok=com.vignette.cachetoken&spf_p.rst_kbDocDisplay=wsrp-resourceState%3DdocId%253Demr_na-c04003114-2%257CdocLocale%253D&javax.portlet.endCacheTok=com.vignette.cachetoken (page 54)

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QUESTION 4

What is one benefit of a software-defined networking (SDN) solution for a WAN?

- A. SDN applications can automatically deploy key services on branch zl or MSR modules in case of a failed WAN connection.
- B. SDN applications provide a remote connection to servers so that remote IT staff can identify and resolve issues.
- C. SDN applications provide a graphical interface for scripting CLI commands for multiple branches at once.

D. SDN applications can adjust WAN bandwidth provisioning granularly, dynamically, and intelligently.

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: Software-defined networking (SDN) is an architecture purporting to be dynamic, manageable, cost-effective, and adaptable, seeking to be suitable for the high-bandwidth, dynamic nature of today's applications.

The SDN architecture is:

Directly programmable: Network control is directly programmable because it is decoupled from forwarding functions.

Agile: Abstracting control from forwarding lets administrators dynamically adjust network-wide traffic flow to meet changing needs.

Reference: Wikipedia, Software-defined networking

QUESTION 5

Which OpenFlow version introduces multiple flow tables?

- A. 1.0
- B. 1.1
- C. 1.2
- D. 1.3

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: Openflow 1.3.1: Support for multiple flow tables is introduced Reference: Open Flow 1.3.1 Support: Controller View

https://wiki.opendaylight.org/images/d/dc/Openflow1.3_Support_for_Opendaylight.pdf

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QUESTION 6

An administrator wants to secure the connection between an HP Provision switch and HP VAN SDN Controller. What is the recommended approach to securing the OpenFlow messages?

- A. Use CA-signed certificates on an HP VAN SDN Controller and the HP Provision switches, and then use TLS to secure communication.

- B. Use OpenFlow message type 5 on the auxiliary channel to secure OpenFlow messages.
- C. Use an IPsec VPN between the HP Provision switch and the HP VAN SDN Controller to secure OpenFlow messages.
- D. Use self-signed certificates on an HP VAN SDN Controller and the HP Provision switches, and then use TLS to secure communication.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: The Openflow controller component relies on PKI to establish mutual trust (2-way SSL) between itself and the Openflow switches that it manages.

Please note that both the Controller and Device certificates must be signed by the same CA, so that the TLS connection will be established.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 7

A customer has a network consisting of 90 switches running OpenFlow 1.0. High Availability is not required as a hybrid network is being used. Which license types does the customer need to purchase? (Select two.)

- A. HP VAN SDN Ctrl 100-node E-LTU
- B. HP VAN SDN Ctrl HA E-LTU
- C. HP VAN SDN Ctrl Base SWw/ 100-node E-LTU
- D. HP VAN SDN Ctrl Base SW w/ 50-node E-LTU
- E. HP VAN SDN Ctrl 50-node E-LTU

Correct Answer: DE

Section: (none)

Explanation

Explanation/Reference:

Explanation: The following licenses are available for the HP VAN SDN Controller:

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* (D) Base controller license (HP VAN SDN Ctrl Base SW w/ 50node E-LTU)--Enables the HP VAN SDN Controller to communicate with up to 50 OpenFlow switches. This license is a prerequisite for the other licenses, and must be installed for you to receive technical support during your first 90 days of use.

*(E) Base controller plus 50 "Add Nodes" license (HP VAN SDN Ctrl 50node E-LTU)--Extends by 50 the number of switches the base controller can communicate with using OpenFlow. In addition, you can install the Add Nodes license multiple times.

For example:

If you install one Add Nodes license on an HP VAN SDN Controller with a base license present, the total number of OpenFlow switches supported is 100. If you install three Add Nodes licenses on an HP VAN SDN controller with a base license, the total number of OpenFlow switches supported is 200. Etc.

Reference: HP VAN SDN Controller License Registration and Activation Guide

QUESTION 8

An SDN developer wants to develop a new OpenFlow proactive application using the HP VAN SDN Controller. The controller is configured with IP address 192.168.56.7 and is using release 2.0. The developer is unsure of the REST APIs available on the controller.

To which URL should you recommend the developer navigate?

- A. <https://192.168.56.7:8443/api>
- B. <https://192.168.56.7:8443/sdn/ui>
- C. <http://192.168.56.7:8443/api>
- D. <http://192.168.56.7:8443/sdn/ui>

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: {base uri}/{api}

This is an unauthenticated API

Use https not http.

Example:

<https://15.255.121.2:8443/api>

Response codes

- Normal: OK (200)
- Error: Not Found (404), Service Unavailable (503)

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Reference: HP VAN SDN Controller 2.2 REST AP

QUESTION 9

A customer wants to deploy an HP ProVision-based network with laptops daisy chained to physical IP phones. The customer also wants the laptop traffic to be managed by OpenFlow, while the phones use traditional QoS. Which OpenFlow switch instance configuration option should the customer use?

- A. QoS passthrough

- B. Aggregate
- C. Virtualization
- D. Passive

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation:

QUESTION 10

What is an advantage of using the HP Network Optimizer SDN application with UC&C applications rather than just the SDN applications?

- A. It enables the QoS trust boundary to be shifted to the switch.
- B. It enables the UC&C Client to select the UC&C application server optimally located for them.
- C. It removes the need for queuing.
- D. It enables QoS verification for BYOD.

Correct Answer: D

Section: (none)

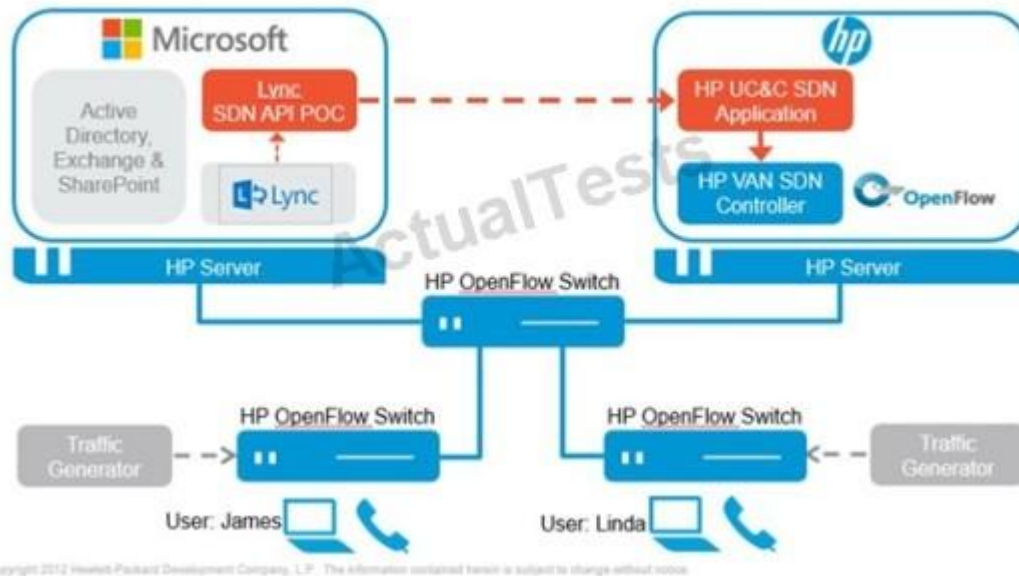
Explanation

Explanation/Reference:

Explanation:

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HP UC&C SDN Application with Microsoft Lync SDN API POC Demo



The first capability that's implemented is the ability of the Lync server (or any communications server, potentially) to dynamically provide to the network controller the IP addresses/ports of the paired endpoints of a real time flow. This enables the network to mark, without deep packet inspection, those flows with a CoS/QoS tag that will give them the proper treatment in the network. This becomes a positive identification of "authorized" real-time flows; any device/flow trying to use that tagging that is not "authorized" through the API can automatically be re-tagged to a best effort service class.

This technique has a number of critical advantages over current techniques. When compared to the typical VLAN, it enables positive tagging of a variety of devices, including BYOD and potentially other systems that might have multiple traffic types (e.g., a PC running a soft client or a tablet).

In addition, when compared to deep packet inspection at each access element, it reduces cost as well as eliminating the errors and complexity that encryption of the packet stream can introduce.

Reference: HP and Microsoft Demo OpenFlow-Lync Applications-optimized Network

QUESTION 11

Which technology can be used in OpenFlow 1.3 that allows rate limiting of packets that are sent to the SDN Controller?

- A. Slicing
- B. sFlow support

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- C. Meter on IP ToS/DSCP bits
- D. Meter table

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: Per-flow meters
OpenFlow 1.3 brings support for per-flow meters. These can be attached to flow entries and can measure and control the rate of packets. One of the main applications of perflow meters is to rate limit packets sent to the controller.

Reference: Production-ready SDN with OpenFlow 1.3

http://h17007.www1.hp.com/docs/interop/2013/37958_HP_N_SDN_Openflow_Brief_042913_lo.pdf (page 2)

QUESTION 12

What is used by the HP VAN SDN Controllers for internal communication between controllers?

- A. REST API Token
- B. Admin ToKen
- C. Auth ToKen
- D. Service Token

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: The Service token is used for internal communication between controllers and is not exposed to the user.

Reference: HP VAN SDN Controller Administrator Guide, Service and Admin Tokens

QUESTION 13

What is a key feature of cloud computing?

- A. server virtualization
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- B. network management virtualization
- C. user self-provisioning
- D. software-defined networking

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Virtualization is a foundational element of cloud computing and helps deliver on the value of cloud computing. Cloud computing is the delivery of shared computing resources, software or data -- as a service and on-demand through the Internet Reference: Virtualization vs. Cloud Computing: What's the Difference?

<http://www.businessnewsdaily.com/5791-virtualization-vs-cloud-computing.html>

QUESTION 14

An administrator wants to navigate to the HP VAN SDN Controller graphical user interface to view options such as the OpenFlow Topology, Alerts, and installed applications. Which URL is correct for release 2.0 of the HP VAN SDN Controller configured with IP address 192.168.56.7?

- A. <https://192.168.56.7:8443/api>
- B. <https://192.168.56.7:8080/sdn/ui>
- C. <https://192.168.56.7:8443/sdn/ui>
- D. <http://192.168.56.7:8443/sdn/ui>

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: Start the SDN Graphical User Interface

1. Use the Google Chrome browser to access the controller's GUI at the controller IP address:

https://<controller_ip_addr>:8443/sdn/ui

For example:

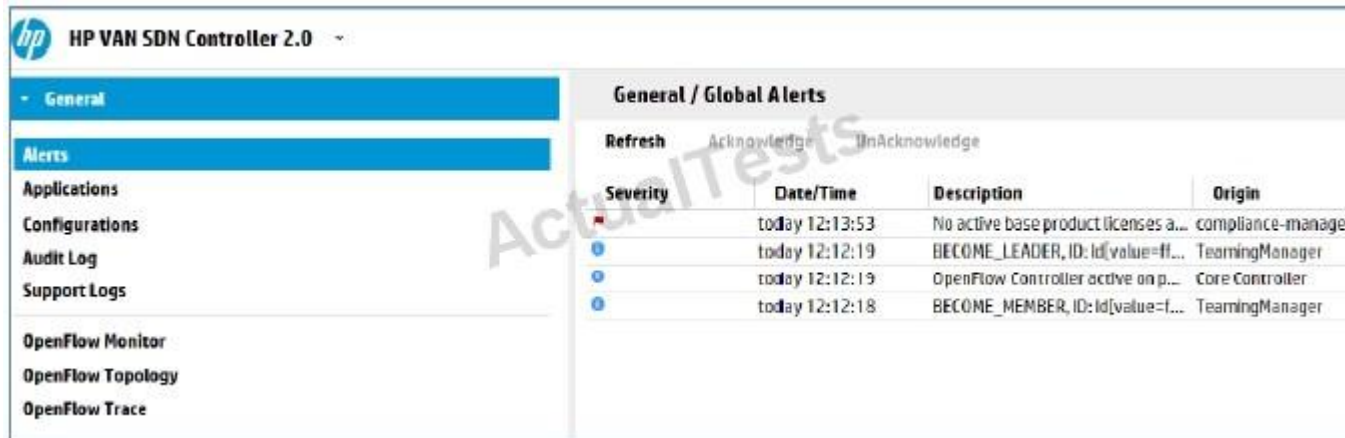
<https://127.0.0.1:8443/sdn/ui>

2. Enter user name and password credentials, then click Login.

The default user name is "sdn".

The default password is "skyline".

The main controller GUI screen then appears:



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Reference: HP VAN SDN Controller Administrator Guide

QUESTION 15

Which OpenFlow message ensures that all previous flow mod messages have been processed by the OpenFlow switch agent and that there are no flow mod messages queued for processing from an earlier time?

- A. Flush
- B. Push
- C. Barrier
- D. Force

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: flush()

Pushes buffered data out the Stream; this is NOT guranteed to flush all data, multiple flush() calls may be required, until needFlush() returns false.

Reference: org.openflow.io, Interface OFMessageOutputStream

QUESTION 16

Which environmental component is used to handle authentication requests to the HP VAN SDN Controller?

- A. Zookeeper
- B. Cassandra
- C. Neutron
- D. Keystone

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: The SDN controller uses Openstack Keystone as an identity management for managing users, generating tokens, as well as token validation.

Reference: HP VAN SDN Controller Administrator Guide

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QUESTION 17

What are two challenges when planning to implement a BYOD environment? (Select two.)

- A. device state unknown
- B. device software inspection
- C. device not under central control
- D. device CA enrollment
- E. device inventory control

Correct Answer: BD

Section: (none)

Explanation

Explanation/Reference:

Explanation: * HP identifies the following main BYOD security challenges:

- (B) Protecting the network from malware
- (D) Providing secure access to the network
- Scaling the network to meet demand
- Ensuring an optimized Wi-Fi experience

* The top BYOD security concerns for enterprise companies are:

+ loss of company or client data (picked by 67%)

+ (D) unauthorized access to company data or systems (57%) + (B) users downloading app or content with embedded security exploits (47%) + (B) malware infections (45%)

+ and lost or stolen devices (41%)

Reference: Bring your own device (BYOD), FAQs

http://h17007.www1.hp.com/docs/byod/faq_4AA4-5466ENW.pdf

QUESTION 18

Which HP IMC SDN Manager functionality provides a logical overview of the OpenFlow network?

- A. SDN Manager reports
- B. SDN Manager dashboard
- C. SDN Manager flow entry management
- D. SDN Manager OpenFlow topology

Correct Answer: B

Section: (none)

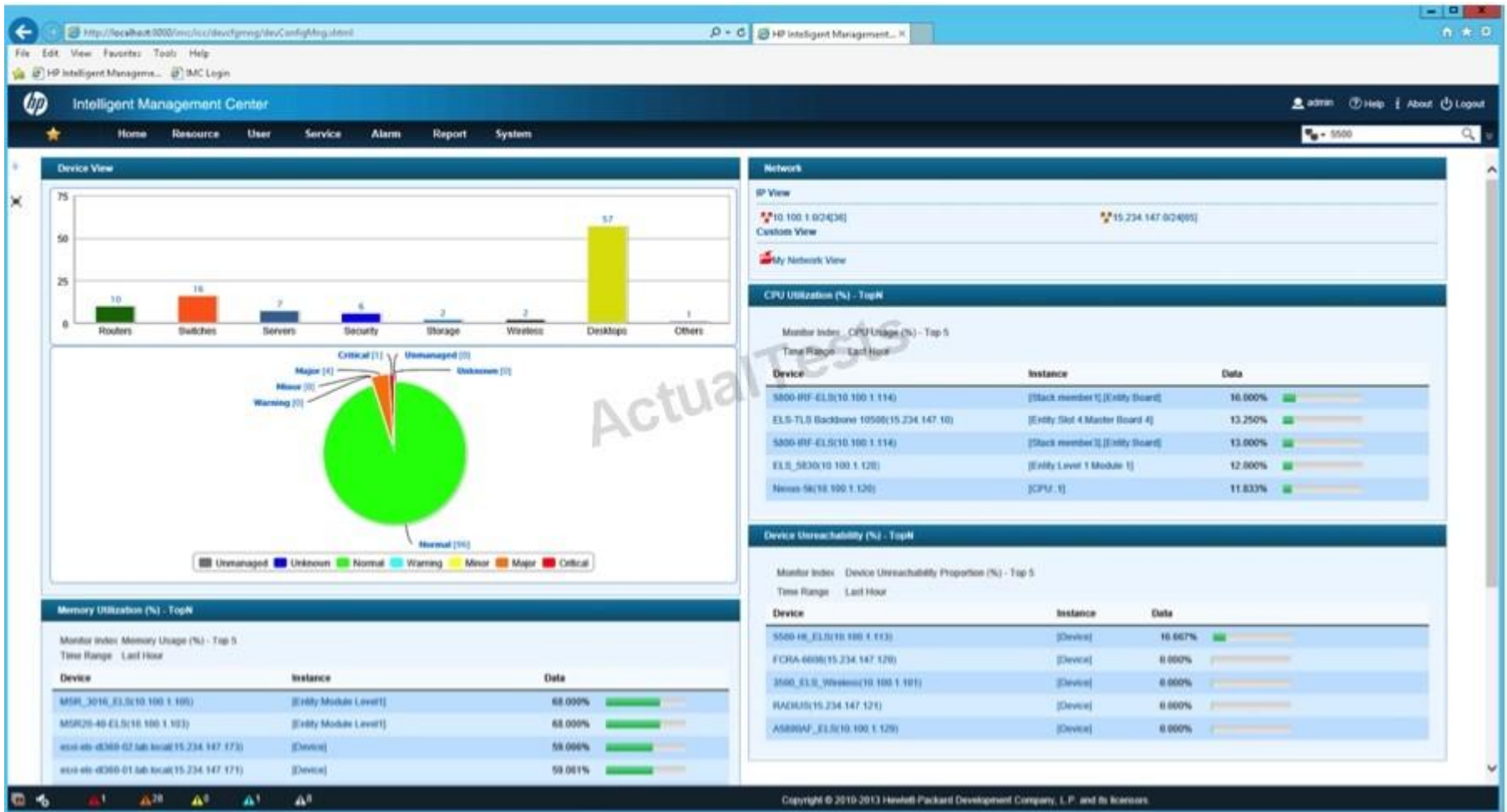
Explanation

Explanation/Reference:

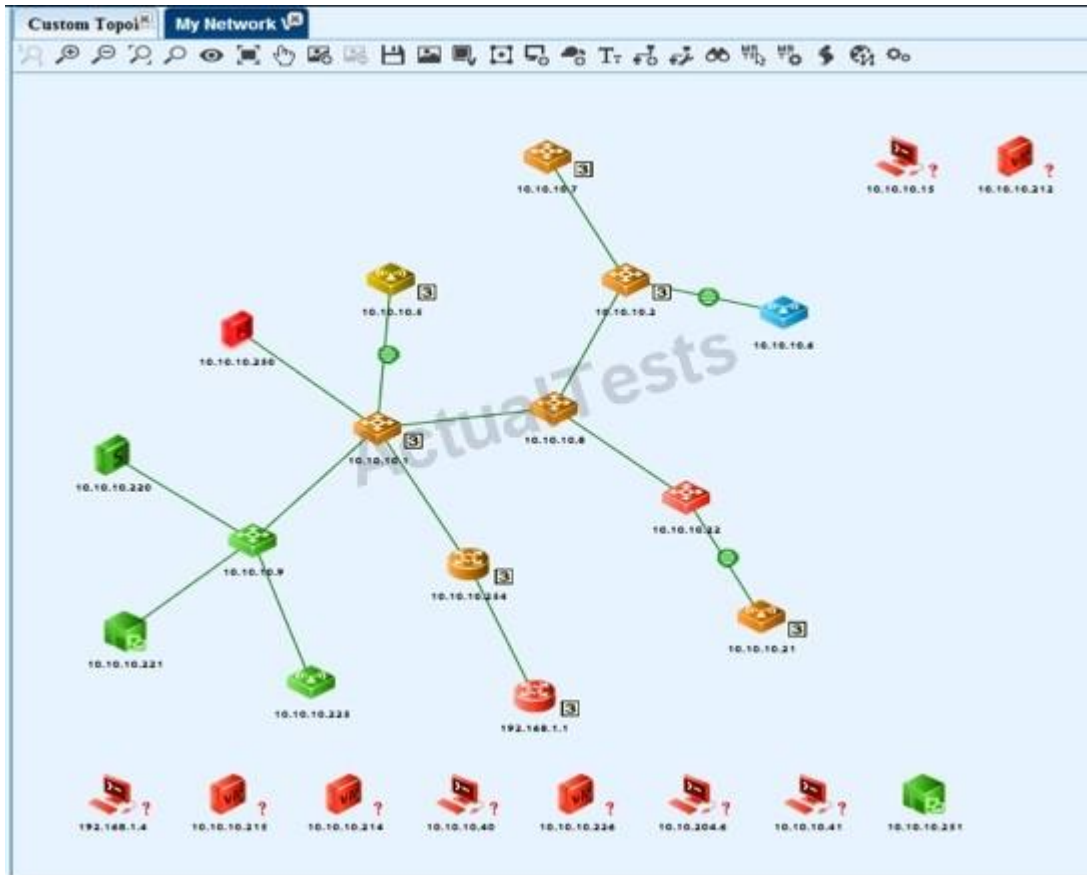
Explanation: HP IMC Dashboard figure:

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My Network view (within SDN Manager Dashboard):



Reference: Review: HP Intelligent Management Center (IMC)

QUESTION 19

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A network environment consists of multiple switches. Some of the switches are configured for OpenFlow 1.0, and some of the switches are configured for OpenFlow 1.3. These switches are configured to communicate with an HP VAN SDN Controller. What is the result of the negotiation?

- A. All OpenFlow switches successfully negotiate to use OpenFlow 1.3 with the controller, and OpenFlow 1.0 switches ignore OpenFlow 1.3 extensions.
- B. OpenFlow 1.3 switches successfully negotiate to use OpenFlow 1.3 with the controller, and the OpenFlow 1.0 switches fail to connect
- C. All switches negotiate to use OpenFlow 1.0 as the highest common version.
- D. OpenFlow 1.3 switches negotiate to use OpenFlow 1.3, and OpenFlow 1.0 switches negotiate to use OpenFlow 1.0.

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: The controller:

- Supports multiple OpenFlow versions at the same time.
- Negotiates with each OpenFlow switch for the highest common OpenFlow version between the switch and controller.

Reference: HP VAN SDN Controller and Applications Support Matrix, Supported OpenFlow versions

QUESTION 20

A switch connects to the HP VAN SDN Controller, which has the HP Network Protector SDN Application installed. These are the switch details:

Switch: 3800-24G-2XG

Firmware: KA15.14.003

OpenFlow negotiated: 1.3

Which channel will be used for communication with the HP Network Protector application?

- A. OpenFlow Channel
- B. Normal Forwarding
- C. Service Insertion Tunnel
- D. GRE Tunnel

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: The application uses the switch firmware information to decide if the communication with the switch

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is through OpenFlow channel or through the application Insertion tunnel. For firmware versions K.15.14 and lower, the application communicates with the switch through OpenFlow channel. For firmware versions KA.15.15.0015 and greater, the application can communicate with the switch either through OpenFlow channel or Service Insertion tunnels.

Reference: HP Network Protector SDN Application Administrator Guide

QUESTION 21

An HP Provision switch loses its OpenFlow connection to the HP VAN SDN Controller. How is traffic processed by default if no controller teaming is configured?

- A. Packets and messages destined to the controller are dropped. Flows continue to expire according to their time-outs. This is because the default setting on HP Provision switches is fail- standalone.
- B. Packets and messages of new flows behave as a legacy switch or router would. Existing flows of this OpenFlow instance are removed. This is because the default setting on HP Provision switches is fail-standalone.
- C. Packets and messages of new flows behave as a legacy switch or router would. Existing flows of this OpenFlow instance are removed. This is because the default setting on HP Provision switches is fail-secure.
- D. Packets and messages destined to the controller are dropped. Flows continue to expire according to their time-outs. This is because the default setting on HP Provision switches is fail- secure.

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow instance connection interruption mode You can set the type of behavior when the switch loses connection with the controller.

OpenFlow instance connection interruption mode

fail-secure

If the switch loses connection with all of the controllers, packets and messages destined to the current controller are dropped. Flows continue to expire according to their time-outs.

Default: fail-secure

Reference: HP OpenFlow Switches

http://h20628.www2.hp.com/km-ext/kmcsdirect/emr_na-c03512348-4.pdf (page 21)

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QUESTION 22

An administrator wants the switches to forward traffic in the legacy mode. If all the controllers fail, which action should the administrator take?

- A. Install a packetin rule as the lowest priority rule in the flow table.
- B. Configure the instance to fail in standalone mode.
- C. Install a packet_out rule as the lowest priority rule in the flow table.
- D. Configure the instance to fail in interruption mode.

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow instance connection interruption mode You can set the type of behavior when the switch loses connection with the controller.
fail-standalone

If the switch loses connection with all of the controllers, packets and messages of new flows behave as a legacy switch or router would. Existing flows of this OpenFlow instance are removed.

Reference: HP OpenFlow Switches

http://h20628.www2.hp.com/km-ext/kmcsdirect/emr_na-c03512348-4.pdf (page 21)

QUESTION 23

Refer to the exhibit.

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GET /of/datapaths [List datapaths](#)

Implementation Notes

List all datapaths that are managed by this controller.

Parameters

Parameter	Value	Description
Try it out!	Hide Response	

Request URL

```
https://192.168.56.7:8443/sdn/v2.0/of/datapaths
```

Response Body

```
{  "error": "com.hp.api.auth.AuthenticationException",  "message": "Authentication required"}
```

Response Code

```
401
```

Response Headers

```
Date: Wed, 26 Feb 2014 22:24:09 GMT
Server: Apache-Coyote/1.1
X-FRAME-OPTIONS: deny
Transfer-Encoding: chunked
Access-Control-Allow-Methods: GET, POST, PUT, HEAD, PATCH, GET, POST, PUT, HEAD, PATCH
Content-Type: application/json
Access-Control-Allow-Origin: *
Access-Control-Allow-Headers: Content-Type, Accept, X-Auth-Token, Content-Type, Accept, X-Auth-Token
```

An SDN developer has tried use RSDoc to dis-cover the datapaths in the network. However, the error in the exhibit is displayed. Why is an error returned rather than the datapaths?

- A. RSDoc does not support the submission of datapath requests until a token has been received oURL.
- B. A username and password has not been submitted to the controller via RSDoc.
- C. A Service Token has been submitted to the controller via the Token field in RSDoc.
- D. An Auth Token has not been submitted to the controller via the Token field in RSDoc.

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: This is an AuthenticationException.

Note: The SDN controller relies on token-based authentication to authenticate its REST APIs. In other words, all REST APIs except the /auth and /rsdoc APIs require an authentication token embedded in an "X-Auth-Token" header to be included with each REST request. The /auth API allows you to obtain a token, while the /rsdoc API provides live REST API documentation information about the controller's REST API.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 24

An HP VAN SDN Controller team is configured consisting of three controllers, using default

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settings.

- The first controller is configured with IP address 10.1.1.1 and priority 10.
- The second controller is configured with IP address 10.1.1.2 and priority 20.
- The third controller is configured with IP address 10.1.1.3 and priority 30.

Currently the third controller (IP address 10.1.1.3) is the leader device. An administrator reboots the third controller.

Which controller will be the leader once this controller comes back online?

- A. the controller with the IP address 10.1.1.3
- B. the controller with the IP address 10.1.1.1
- C. the controller with the IP address 10.1.1.2
- D. The leader role will be shared amongst all team members.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: Once a team is configured, the configuration and monitoring of team members and their associated OpenFlow switches is performed by the team manager. If the team manager goes down, the controller with the next highest priority in the team configuration becomes the team manager.

Note: Team Management

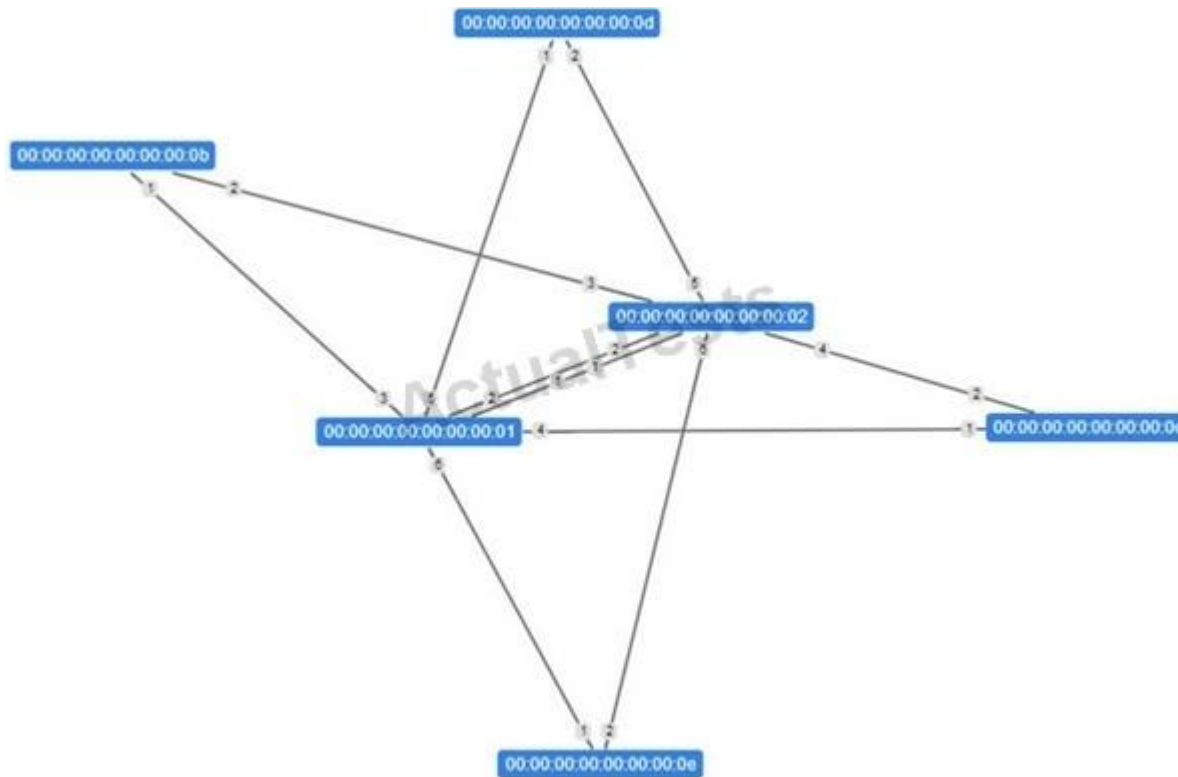
Each controller belonging to a team is a team member. To centralize team management and control, one controller is designated as the team manager. Teaming is configured on one controller and is automatically propagated to the other controllers in the team, regardless of which controller becomes the team manager.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 25

Refer to the exhibit.

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Mininet is being used by a developer to test an OpenFlow RESTful API application developed in Python. The developer is able to view the switches in the OpenFlow topology diagram shown in the exhibit, but no hosts are displayed in the topology diagram. The same behavior is seen when making a RESTful API call for nodes via the RESTful API. Switch information is provided via API calls from the HP VAN SDN Controller, but no nodes are shown.

What is a possible issue?

- A. Traffic needs to be sent by the Mininet nodes before they will be discovered by the HP VAN SDN Controller.
- B. The developer is using the incorrect API calls and needs to ensure that tokens are sent when requesting information from the HP VAN SDN Controller
- C. OpenFlow communication between Mininet and the HP VAN SDN Controller is not functioning correctly. Wireshark can be used to aid with troubleshooting the OpenFlow communication.
- D. The Topology Service has been stopped on the HP VAN SDN Controller and needs to be started.

Correct Answer: D

Section: (none)

Explanation**Explanation/Reference:**

Explanation: The Topology service is used to create a network graph and compute the shortest path between two hosts.

Note: Mininet is a network emulator that can create and emulate an entire OpenFlow network locally on your PC.

Incorrect:

Not C: No need to analyze packages.

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Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting, analysis, software and communications protocol development, and education.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 26

A single HP VAN SDN Controller is used to control OpenFlow enabled switches that operate in virtualization mode. An internal application is installed on the controller that redirects classified traffic to a specific VLAN. The connection between the controller and the network is lost. The HP OpenFlow enabled switches' connection interruption mode is set to standalone mode.

What is the forwarding behavior of the OpenFlow enabled switches?

- A. Based on the timeout values, the flow entries age out, and only OpenFlow traffic is discarded
- B. All flow entries are removed, and traffic is forwarded using normal switch processing.
- C. All flow entries are set not to age out, and the classified traffic is still redirected.
- D. Based on the timeout values, the flow entries are removed from the flow tables, and all traffic is discarded on the switches.

Correct Answer: B

Section: (none)

Explanation**Explanation/Reference:**

Explanation: OpenFlow instance connection interruption mode You can set the type of behavior when the switch loses connection with the controller. fail-standalone

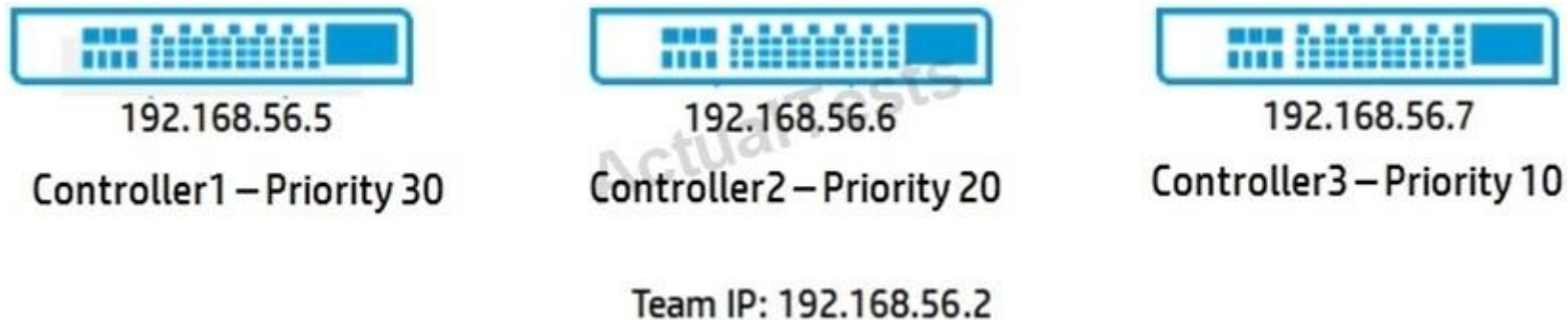
If the switch loses connection with all of the controllers, packets and messages of new flows behave as a legacy switch or router would. Existing flows of this OpenFlow instance are removed.

Reference: HP OpenFlow Switches

QUESTION 27

Refer to the exhibit

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HP HP2-Z31 Exam



A team of HP VAN SDN Controllers has been configured using the controllers shown in the exhibit. Which controller will become the team leader by default?

- A. 192.168.56.2
- B. 192.168.56.7
- C. 192.168.56.5
- D. 192.168.56.6

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: The controller with the highest priority.

Once a team is configured, the configuration and monitoring of team members and their associated OpenFlow switches is performed by the team manager. If the team manager goes down, the controller with the next highest priority in the team configuration becomes the team manager.

Note: Team Management

Each controller belonging to a team is a team member. To centralize team management and control, one controller is designated as the team manager. Teaming is configured on one controller and is automatically propagated to the other controllers in the team, regardless of which controller becomes the team manager.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 28

Refer to exhibit.

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Time	Event	Remote ID	Message
12:51:30.399	MESSAGE_RX	00:14:00:9c:02:d8:18:00	{ofm:[V_1_3,PACKET_IN,110,108],inPort=0x1(1),reason=NO_MA...
12:51:30.399	MESSAGE_TX	00:14:00:9c:02:d8:18:00	{ofm:[V_1_3,PACKET_OUT,100,108],acts=[[Act:[OUTPUT,len=16]...
12:51:30.570	DATAPATH_CONNECT...	192.168.56.103/52076	
12:51:30.570	MESSAGE_RX	192.168.56.103/52076	{ofm:[V_1_3,HELLO,16,10],elems=VERSION_BITMAP}
12:51:30.570	MESSAGE_TX	192.168.56.103/52076	{ofm:[V_1_3,HELLO,16,10],elems=VERSION_BITMAP}
12:51:30.571	MESSAGE_TX	192.168.56.103/52076	{ofm:[V_1_3,FEATURES_REQUEST,8,40587]}
12:51:30.770	MESSAGE_RX	00:0a:00:9c:02:d8:18:00	{ofm:[V_1_3,FEATURES_REPLY,32,40587],dpid=00:0a:00:9c:02:...
12:51:30.772	MESSAGE_TX	00:0a:00:9c:02:d8:18:00	{ofm:[V_1_3,MULTIPART_REQUEST,16,40588],PORT_DESC,flgs=n...
12:51:30.772	MESSAGE_TX	00:0a:00:9c:02:d8:18:00	{ofm:[V_1_3,SET_CONFIG,12,40589],flags=[fragReasm],msLen=...
12:51:30.772	MESSAGE_TX	00:0a:00:9c:02:d8:18:00	{ofm:[V_1_3,MULTIPART_REQUEST,16,40590],TABLE_FEATURES,...
12:51:30.774	MESSAGE_RX	00:0a:00:9c:02:d8:18:00	{ofm:[V_1_3,MULTIPART_REPLY,1616,40588],PORT_DESC,flgs=...
12:51:30.902	MESSAGE_RX	00:0a:44:31:92:5f:aa:3b	{ofm:[V_1_3,PACKET_IN,110,0],inPort=0x2(2),reason=NO_MATC...
12:51:30.902	MESSAGE_TX	00:0a:44:31:92:5f:aa:3b	{ofm:[V_1_3,PACKET_OUT,100,0],acts=[[Act:[OUTPUT,len=16],p...
12:51:30.904	MESSAGE_RX	00:0a:00:9c:02:d8:ff:c0	{ofm:[V_1_3,PACKET_IN,110,1970282596],inPort=0x7(7),reaso...
12:51:30.943	MESSAGE_RX	00:14:00:9c:02:d8:18:00	{ofm:[V_1_3,PACKET_IN,110,1970282596],inPort=0x7(7),reaso...

Which HP VAN SDN Controller interface can a network administrator use to troubleshoot the southbound interface of the controller and displays the output shown in the exhibit?

- A. Audit Log
- B. OpenFlow Monitor
- C. OpenFlow Tracer
- D. Dissector

Correct Answer: C

Section: (none)


Explanation

Explanation/Reference:

Explanation: The OpenFlow Tracer is a built-in packet sniffer similar to Wireshark.

Incorrect:

Not Openflow Monitor:

 SDN Controller Console

General

Alerts

Applications

Configurations

Audit Log

Support Logs

OpenFlow Monitor

OpenFlow Topology

OpenFlow Trace

General / OpenFlow Monitor

Refresh

Summary

Ports

Flows

Groups

Data Path ID	Address	Negotiated Version
00:00:00:00:00:00:01	127.0.0.1	1.0.0
00:00:00:00:00:00:02	127.0.0.1	1.0.0
00:00:00:00:00:00:0b	127.0.0.1	1.0.0
00:00:00:00:00:00:0c	127.0.0.1	1.0.0
00:00:00:00:00:00:0d	127.0.0.1	1.0.0
00:00:00:00:00:00:0e	127.0.0.1	1.0.0

QUESTION 29

Refer to the exhibit.

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					Summary	Ports	Flows
Table ID	Priority	Packets	Bytes	Matches	Actions/Instructions		
▸ n/a	29999	0	0	in_port: 7 eth_dst: fe:d0:2d:41:ac:2c eth_src: ee:78:d1:10:20:07 eth_type: arp	output: 2		
▸ n/a	29999	1	98	in_port: 2 eth_dst: ee:78:d1:10:20:07 eth_src: 1a:65:7a:59:25:cd eth_type: ipv4	output: 7		
▸ n/a	29999	1	42	in_port: 4 eth_dst: 6a:3a:58:23:cc:7f eth_src: 26:02:c6:24:87:40 eth_type: arp	output: 2		
▸ n/a	29999	0	0	in_port: 5 eth_dst: c6:8f:a8:b7:68:cd eth_src: 22:f3:3d:22:f8:6e eth_type: arp	output: 2		
▸ n/a	29999	0	0	in_port: 2 eth_dst: 22:f3:3d:22:f8:6e eth_src: 12:71:bd:64:cc:ae eth_type: arp	output: 5		

OpenFlow has been enabled on an HP switch and is communicating with an HP VAN SDN Controller. The network administrator has checked the switch flow table entries via the controller graphical user interface, but is unsure of the format. The administrator has taken a screenshot and sent you a copy. Why does the flow table display n/a?

- A. The switch has negotiated to use OpenFlow 1.0 with the controller for this instance.
- B. The switch has negotiated to use OpenFlow 1.3 with the controller for this instance,
- C. The switch has negotiated to use standard mode with the controller for this OpenFlow instance.
- D. The switch has negotiated to use ip-control-table-mode with the controller for this OpenFlow instance.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Table ID n/a indicates that OpenFlow 1.0 is in use.

Example of the Flows View for a Specific OpenFlow Device

Flows for Data Path ID: 00:00:00:00:00:00:02						
Table ID	Priority	Packets	Bytes	Matches	Actions/Instructions	
▶ n/a	29999	0	0	in_port: 3 eth_dst: 0e:9d:45:7c:04:ab eth_src: 3a:84:9e:66:a7:ca eth_type: arp	output: 4	
▶ n/a	29999	1	98	in_port: 5 eth_dst: 96:a7:1b:1e:7d:d9 eth_src: ba:61:e0:9e:6f:8e eth_type: ipv4	output: 4	
▶ n/a	29999	0	0	in_port: 5 eth_dst: 82:4b:62:3b:ed:b9 eth_src: 76:37:b7:06:d7:3d eth_type: arp	output: 6	

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The "Table ID" field applies to OpenFlow 1.3 and greater, but not to OpenFlow 1.0.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 30

A network administrator is attempting to forward HTTP traffic out of port Gigabit Ethernet 2 on an HP 3800 switch. The switch has negotiated to use OpenFlow 1.0 with the HP VAN SDN Controller. Which REST API call will correctly update the flow table of the switch with an entry that does not require active matching traffic to keep the flow entry in the OpenFlow table?

A 

```
{
  "flow": {
    "priority": 30000,
    "idle_timeout": 60,
    "match": [
      {"eth_type": "ipv4"},
      {"ipv4_src": "10.0.0.1"},
      {"ipv4_dst": "10.0.0.22"},
      {"ip_proto": "tcp"},
      {"tcp_dst": "80"}
    ],
    "actions": [{"output": 6}]
  }
}
```

B

```
{
  "flow": {
    "priority": 30000,
    "idle_timeout": 60,
    "match": [
      {"eth_type": "ipv4"},
      {"ipv4_src": "10.0.0.1"},
      {"ipv4_dst": "10.0.0.22"},
      {"ip_proto": "tcp"},
      {"tcp_dst": "80"}
    ],
    "actions": [{"output": 2}]
  }
}
```

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C  {

```
"flow": {  
  "priority": 1000000,  
  "idle_timeout": 0,  
  "match": [  
    {"eth_type": "ipv4"},  
    {"ipv4_src": "10.0.0.1"},  
    {"ipv4_dst": "10.0.0.22"},  
    {"ip_proto": "tcp"},  
    {"tcp_dst": "80"}  
  ],  
  "actions": [{"output": 2}]  
}
```

D 

```
{
  "flow": {
    "priority": 30000,
    "idle_timeout": 0,
    "match": [
      {"eth_type": "ipv4"},
      {"ipv4_src": "10.0.0.1"},
      {"ipv4_dst": "10.0.0.22"},
      {"ip_proto": "tcp"},
      {"tcp_dst": "80"}
    ],
    "actions": [{"output": 2}]
  }
}
```

- A. Option A
- B. Option B
- C. Option C
- D. Option D

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Note:

idle_timeout - Number of idle seconds before the flow entry is removed. Defaults to no idle timeout.

priority - When using non-exact (wildcarded) matches, this specifies the priority for overlapping matches. Higher values are higher priority. Not important for exact or non-overlapping entries.

actions - A list of actions to apply

output: if no group action is specified, forward the packet on the port specified by the output action

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QUESTION 31

Which HP IMC SDN Manager functionality provides a detailed overview of OpenFlow counters and DPIDs?

- A. SDN Manager flow entry management
- B. SDN Manager OpenFlow device management
- C. SDN Manager dashboard
- D. SDN Manager service flow management

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow device management

Displays all the flow entries, counters, DPIDs, and other OpenFlow statistics per device. Helps locate OpenFlow devices within the network topology

Reference: HP IMC Virtual Application Networks Software-defined Networking Manager Software

<http://www8.hp.com/h20195/v2/GetPDF.aspx%2F4AA4-9879ENN.pdf> (page 2)

QUESTION 32

How is a leader elected in an HP VAN SDN Controller team by default?

- A. by the lowest IP address value
- B. by the lowest priority value
- C. by the highest priority value
- D. by the highest IP address value

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: Once a team is configured, the configuration and monitoring of team members and their associated OpenFlow switches is performed by the team manager. If the team manager goes down, the controller with the next highest priority in the team configuration becomes the team manager.

Note: Team Management

Each controller belonging to a team is a team member. To centralize team management and control, one controller is designated as the team manager. Teaming is configured on one controller and is automatically propagated to the other controllers in the team, regardless of which controller becomes the team manager.

Reference: HP VAN SDN Controller Administrator Guide

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QUESTION 33

Which command installs the HP VAN SDN Controller software?

- A. `sudo dpkg -i *hp-sdn-ctl`
- B. `sudo dpkg -i hp-sdn-ctl_2.0.0.4253_amd64.deb`
- C. `sudo dpkg -P hp-sdn-ctl_2.0.0.4253_amd64.deb`
- D. `sudo dpkg -i hp-sdn-ccl 2.0.0.4253 amd64.deb`

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: Install the HP VAN SDN Controller from the directory in which it is stored:

```
~$ sudo dpkg -i hp-sdn-ctl_version_amd64.deb
```

· Replace version with a value for release version 2.0.1.4254 or greater, as shown in Example.

Example: Installing the controller software

```
~$ sudo dpkg -i hp-sdn-ctl_2.0.1.4254_amd64.deb
```

Reference: HP VAN SDN Controller Installation Guide

QUESTION 34

A network administrator wants to back up the HP VAN SDN Controller. Which files will need to be downloaded and kept together? (Select two.)

- A. `sdn_controller_backup_<ip-address>.rar`
- B. `sdn_controller_backup_<ip-address>.rar.MD5`
- C. `sdn_controller_backup_<ip-address>.zip`
- D. `sdn_controller_backup_<ip-address>.zip.MD5`
- E. `sdn controller backup <ip-address>.tgz`

Correct Answer: CD

Section: (none)

Explanation

Explanation/Reference:

Explanation: Download a Backup From the Controller to Another Location Both the .zip file and the .MD5 (checksum) file (zip.MD5) should be downloaded to the same, secure location. Choose the correct name now; you cannot rename the files later

Details (check the file extensions):

1. Download the Backup .zip File:

```
curl --no-proxy <controller_ip> --header "X-Auth-Token:<auth_token>" --fail -ksSfL --request GET -- url
```

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```
"https://<system_ip>:8443/sdn/v2.0/systems/<controller_uid>/backup?csum=false" > <path-and- file-name>.zip
```

2. Download the backup .MD5 (Checksum) File

```
curl --no-proxy <controller_ip> --header "X-Auth-Token:<auth_token>" --fail -ksSfL --request GET -- url "https://<controller_ip>:8443/sdn/v2.0/systems/  
<controller_uid>/backup?csum=true" > <path- and-file-name>.zip.MD5
```

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 35

A customer writes an internal application that does not run properly and crashes. Which component of the HP VAN SDN Controller framework offers protection so that other applications continue to function?

- A. OSGi
- B. Zookeeper
- C. Cassandra
- D. Keystone

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Note:

The OSGi specification describes a modular system and a service platform for the Java programming language that implements a complete and dynamic component model, something that does not exist in standalone Java/VM environments. Applications or components, coming in the form of bundles for deployment, can be remotely installed, started, stopped, updated, and uninstalled without requiring a reboot; management of Java packages/classes is specified in great detail. Application life cycle management is implemented via APIs that allow for remote downloading of management policies. The service registry allows bundles to detect the addition of new services, or the removal of services, and adapt accordingly.

Incorrect:

Not Zookeeper: ZooKeeper is a centralized service for maintaining configuration information, naming, providing distributed synchronization, and providing group services. Not Cassandra: Apache Cassandra is an open source distributed database management system designed to handle large amounts of data across many commodity servers, providing high availability with no single point of failure.

Not Keystone: The SDN controller uses Openstack Keystone as an identity management for managing users, generating tokens, as well as token validation.

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QUESTION 36

An administrator has checked the Device Status tab on the HP Network Protector SDN application. An HP 3800-24G-2XG switch is displaying a yellow indicator for VLAN 10. What is a potential issue?

- A. VLAN disabled from DNS inspection
- B. All parameters are OK.
- C. SNMP credentials are incorrect or not working.
- D. current and best inspection mode mismatch

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Device Status, Health status: Yellow

* The status of one or more VLANs configured on the switch is not green

* One of the VLANs configured on the switch has been disabled from DNS inspection Reference: HP Network Protector SDN Application Administrator Guide

QUESTION 37

Which components are used to identify a flow entry in OpenFlow 1.0?

- A. Match and Priority
- B. Action and Priority
- C. Action and Index
- D. Match and Index

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: A flow table entry is identified by its match fields and priority: the match fields and priority taken together identify a unique flow entry in the flow table. T

Reference: OpenFlow Switch Specification

<https://www.opennetworking.org/images/stories/downloads/sdn-resources/onf-specifications/openflow/openflow-spec-v1.4.0.pdf> (page 16)

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QUESTION 38

Refer to the exhibit.

Name	Version	State
▶ Network Protector	1.0.0.SNAPSHOT	RESOLVED
▶ Path Diagnostics	2.1.0.SNAPSHOT	ACTIVE
▶ Link Manager	2.1.0.SNAPSHOT	ACTIVE
▶ Network Services	2.1.0.SNAPSHOT	ACTIVE
▶ Node Manager	2.1.0.SNAPSHOT	ACTIVE
▶ Path Daemon	2.1.0.SNAPSHOT	ACTIVE
▶ Topology Manager	2.1.0.SNAPSHOT	ACTIVE
▶ Topology Viewer	2.1.0.SNAPSHOT	ACTIVE

What is the status of the Network Protector Application in the exhibit?

- A. The application has been uploaded to the controller and can now be installed.
- B. The application is running and servicing requests.
- C. The application is present, with all dependencies available, but is stopped and not servicing requests.
- D. Some aspect of the selected application could not be started, but other aspects are operating

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: Application States:

* RESOLVED

The application is present, with all dependencies available, but is stopped and not servicing requests.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 39

An administrator wants to install the HP VAN SDN Controller in a production environment using virtualization technologies. Which hypervisors are supported? (Select two.)

- A. VirtualBox 4.2.20 and greater
- B. KVM Version 2.4.5-1 and greater
- C. Parallels 8.0 and greater
- D. VMware ESXi Versions 5.0.0, 5.0.1, and greater
- E. VMware workstation 9.0 and greater

Correct Answer: BD

Section: (none)

Explanation

Explanation/Reference:

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Explanation: Software you must install before you begin the controller installation process

* Operating system: Ubuntu 12.04 LTS 64-bit Server (Linux 3.2 kernel)

* Supported hypervisors (if operating system is run on a virtual machine):

KVM Version 2.4.5-1 and greater

ESXi Versions 5.0.0 and greater

Reference: HP VAN SDN Controller and Applications Support Matrix

QUESTION 40

Which mechanism provides authentication of API calls via the REST API within the HP VAN SDN Controller?

- A. Openstack Keystone
- B. Java
- C. RabbitMQ
- D. Openstack

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: The SDN controller uses Openstack Keystone as an identity management for managing users, generating tokens, as well as token validation.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 41

A controller is able to register for asynchronous messages from an OpenFlow switch, but when the controller attempts a flow_mod. the OpenFlow command is rejected. Which mode is the controller in from the switch point of view?

- A. Leader
- B. Slave
- C. Master
- D. Equal

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation:

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QUESTION 42

What is the minimum number of HP VAN SDN Controllers supported in a team?

- A. One
- B. Two
- C. Three
- D. Four

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: The minimum number of team members for an HP VAN SDN Controller team is three.

Reference: HP VAN SDN Controller Installation Guide

QUESTION 43

Which protocol is used to discover directly connected links between OpenFlow devices?

- A. SNMP
- B. CDP
- C. OF-CONFIG
- D. LLDP

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation:

LLDP is used to discover direct links between switches and BDDP is used to discover the switches in the same broadcast domain.

Note: Using a link-discovery module, the controller generates both LLDP and broadcast packets (referred to as BDDPs) and sends them to all neighboring switches on a regular basis.

Reference: OpenFlow Controller

QUESTION 44

A network integrator plans to implement the HP Network Protector SDN application in a network. What is a key consideration with regards to the OpenFlow protocol implementation and switch

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selection?

- A. If the access switch supports PACKETIN
- B. If the core switch supports PACKETIN
- C. If the access switch supports FORWARD_NORMAL
- D. if the core switch supports FORWARD_NORMAL

Correct Answer: A

Section: (none)

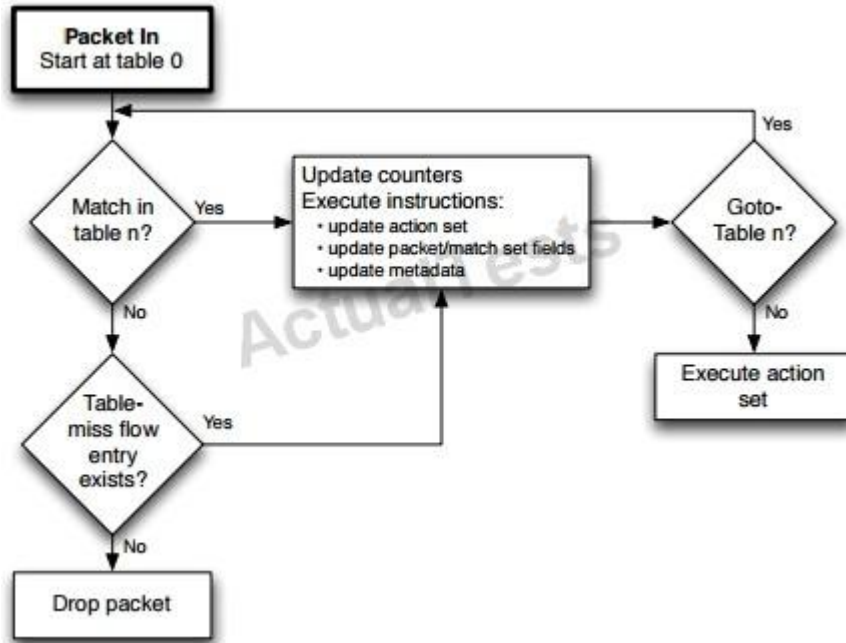
Explanation

Explanation/Reference:

Explanation:

Note:

* The PacketIn message is a way for the switch to send a captured packet to the controller. There are two reasons why this might happen; there could be an explicit action as a result of a match asking for this behavior, or from a miss in the match tables, or a ttl error.



Reference: OpenFlow Switch Specification Version 1.3.1

QUESTION 45

Why would an architect require an application to be written as an internal application rather than as an external application?

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- A. lower cost of development
- B. faster event-driven responses
- C. greater flexibility of platform choices

D. increased program language options

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: HP SDN Controller Internal Applications and Modules There are two main ways applications interact with the controller:

- Within the controller using native applications or modules (Java based or byte compatible applications such as Scala).

- Outside the controller using web based applications (using RESTful APIs).

Application Types:

- Native Applications / Modules - This is the ideal model for applications that need to exert relatively finegrained, frequent and low-latency control interactions with the environment, e.g. handling packet-in events, etc.

- Web Based applications - Suitable for applications that need to exert "business" level, i.e.

relatively coarsegrained,

infrequent and high-latency control interactions with the environment, e.g. path provisioning, flow inspections, etc.

Reference: HP SDN Controller Architecture, Technical Solution Guide

QUESTION 46

Which HP VAN SDN Controller service processes ARP replies in Packetin messages sent by the OpenFlow switches?

- A. Controller Service
- B. Path Daemon
- C. Path Diagnostics Service
- D. Node Manager

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: Node Manager

Operation:

Learns and maintains end-host locations in the network. Uses information received from network devices to maintain the ARP table and end host data.

Uses the Topology Service to determine if a port receiving a

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packet is an edge port or not.

Learns and maintains end nodes in the controller domain, and associates end nodes with edge ports.
Builds an ARP cache with MAC-IP translations of end hosts.
Maintains ARPs on a per-VID basis.
Provides the edge port details for end hosts.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 47

HP IMC provides comprehensive Fault Configuration, Accounting, Performance and Security functionality. Which functionality does the HP IMC SDN Manager provide? (Select three.)

- A. Accounting
- B. Reporting
- C. Performance
- D. Fault
- E. Configuration

Correct Answer: ACE

Section: (none)

Explanation

Explanation/Reference:

Explanation: A, B, C

IMC VAN SDN Manager will feature full-fault, configuration, accounting, performance and security management for HP enabled SDN domains..

- Enable deployment, monitoring and management of HP OpenFlow enabled switches

- * Visualize traffic flow and performance monitoring in HP SDN Domains

- * Backup and restore configurations and software of HP SDN Controllers · Provide graphical OpenFlow troubleshooting with path analysis

Reference: HP IMC Virtual Application Networks Modules

QUESTION 48

Which northbound API for external applications do developers use to communicate with the HP VAN SDN Controller?

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- A. JSON
- B. NETCONF
- C. HTTPS

D. REST

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: PLUMgrid's proprietary controller is designed to maintain control of its network virtualization solution and is not targeted at controlling external elements today. Like other network virtualization-focused controllers, it provides RESTful APIs in the form of proprietary northbound interfaces.

Reference: SDN Controller Wars 2.0 ON.LAB & Juniper Re-Ignite the Open-Source Battleground. Part 1 of 2

<http://www.sdncentral.com/market/controller-onlab-juniper-open-source-sdn-battleground- part1/2013/12/>

QUESTION 49

Which service on the HP VAN SDN Controller allows Observation posts to be set on a network?

- A. Network Node Service
- B. Path Diagnostic Service
- C. Path Daemon Service
- D. Topology Service

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: Path Diagnostics

Determines and verifies the path taken by a specific packet from a source host to destination host.

Evaluates flows configured across the switches in the control domain for diagnosis

Creates 'Observation posts' on every switch in the path that the packet would take

Tallys packet_ins from the observation posts to figure out where a path is broken

Lists neighbors for any given device

Reference: HP VAN SDN Controller Administrator Guide

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QUESTION 50

Which important functions does the HP VAN SDN Controller provide for an SDN deployment? (Select two.)

- A. It discovers HP switches using SNMP. configures OpenFlow on them, and enables the OpenFlow instances.

- B. It provides a platform for SDN applications and mediates between these applications and network infrastructure devices.
- C. It delivers comprehensive, policy-based management for both traditional networks and SDN networks, enabling gradual integration of SDN applications.
- D. It uses APIs to expose an abstracted and centralized control plane to network applications.
- E. It provides built-in templates for provisioning virtual machine network connectivity and automatically applies those templates as required.

Correct Answer: BC

Section: (none)

Explanation

Explanation/Reference:

Explanation: The HP VAN SDN Controller is a Java-based OpenFlow controller enabling SDN solutions such as network controllers for the data center, public cloud, private cloud, and campus edge networks. This includes providing an open platform for developing experimental and special- purpose network control protocols using a built-in OpenFlow controller.

The HP VAN SDN Controller is a platform for developing SDN applications and deploying SDN applications. The controller can be characterized as providing a Base Control Platform, a Distributed Platform for High-Availability and Scalability, and an Extensible Platform.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 51

Spanning Tree Protocol is disabled on a network edge port. The port is assigned to a VLAN, which is a member of an aggregate OpenFlow 1.0 instance. What is the default behavior of all ingress traffic when no flow entry exists?

- A. Only SDN classified traffic is forwarded to the SDN Controller.
- B. All traffic is discarded.
- C. All traffic is forwarded to the egress port to the final destination address.
- D. All traffic is forwarded to the SDN Controller.

Correct Answer: B

Section: (none)

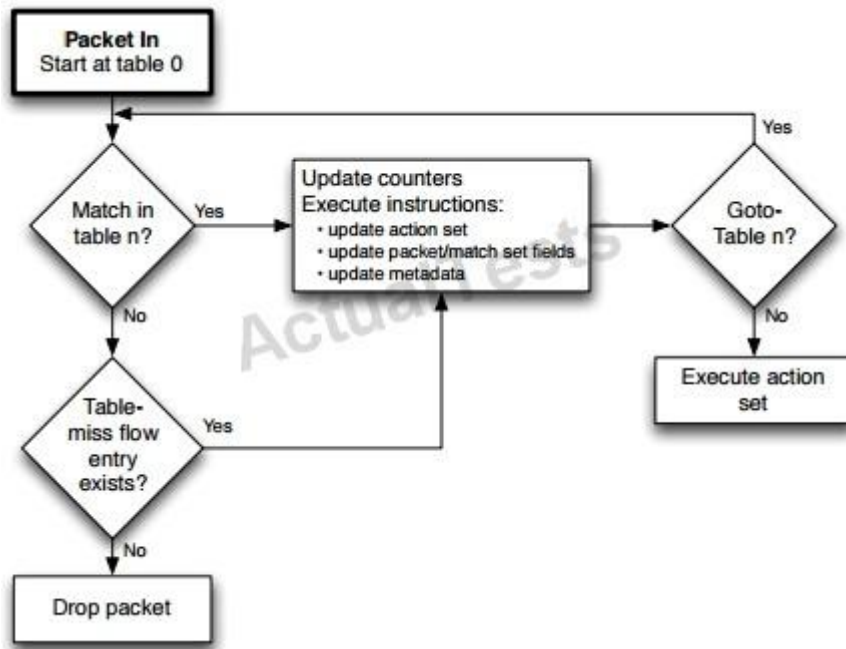
Explanation

Explanation/Reference:

Explanation: Flowchart detailing packet flow through an OpenFlow switch.

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Reference: OpenFlow Switch Specification Version 1.3.1

QUESTION 52

Which statement best describes software-defined networking (SDN)?

- A. SDN allows software to leverage the network infrastructure, enabling a centralized and policy- based approach to network provisioning and traffic forwarding.
- B. SDN allows administrators to share software, policies, templates, and applications between multiple virtual machines that are running on the same network.
- C. SDN is another name for OpenFlow, a protocol that lets switches handle traffic with OpenFlow tables rather than MAC forwarding tables and routing tables.
- D. SDN lets IT developers manage physical infrastructure devices directly without pre-defined templates or intermediary devices.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: The HP VAN SDN Controller is a Java-based OpenFlow controller enabling SDN solutions such as network controllers for the data center,

public cloud, private cloud, and campus edge networks. This includes providing an open platform for developing experimental and special- purpose network control protocols using a built-in OpenFlow controller.

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The HP VAN SDN Controller is a platform for developing SDN applications and deploying SDN applications. The controller can be characterized as providing a Base Control Platform, a Distributed Platform for High-Availability and Scalability, and an Extensible Platform.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 53

Refer to the exhibits.

```
<5900-2>dis openflow instance 10
```

```
Instance 10 information:
```

```
Configuration information:
```

```
Description   : vlan10
```

```
Active status : active
```

```
Inactive configuration:
```

```
none
```

```
Active configuration:
```

```
Classification VLAN, total VLANs(1)
```

```
10
```

```
In-band management VLAN, total VLANs(0)
```

```
empty VLAN
```

```
Connect mode: multiple
```

```
MAC address learning: Enabled
```

```
Flow table:
```

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Table ID(type): 0(Extensibility), count: 0

Flow-entry max-limit: 65535

Datapath ID: 0x000a44319261869e

Port information:

GigabitEthernet1/0/2

GigabitEthernet1/0/4

GigabitEthernet1/0/5

GigabitEthernet1/0/7

GigabitEthernet1/0/8

Active channel information:

Failopen mode: secure

<5900-2>

```
[5900-2]display openflow instance 10 controller
```

```
Instance 10 controller information:
```

```
Reconnect interval: 60 (s)
```

```
Echo interval      : 5 (s)
```

```
Controller ID      : 1
```

```
Controller IP address : 192.168.56.7
```

```
Controller port     : 6633
```

```
Controller role     : Equal
```

```
Connect type       : TCP
```

```
Connect state      : Established
```

```
Packets sent       : 440
```

```
Packets received   : 888
```

```
SSL policy         : --
```

```
VRF name           : --
```

```
[5900-2]
```

What happens when the switch shown in the exhibit loses connectivity to the HP VAN SDN Controller?

- A. The switch removes all flow entries and reverts to the normal forwarding process,
- B. The switch removes all flow entries and continues to use the OpenFlow pipeline.
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- C. The switch forwards traffic based on flow tables and does not delete unexpired flow entries.
- D. The switch uses the normal forwarding process and does not delete the flow entries.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation:

QUESTION 54

How does an HP VAN SDN Controller team provide high availability for OpenFlow switches?

- A. By using the northbound controller interface tied to a region configuration
- B. By using the northbound controller interface with a secondary interface
- C. By using the southbound controller interface tied to a region configuration
- D. By using the southbound controller interface with a secondary interface

Correct Answer: C

Section: (none)

Explanation

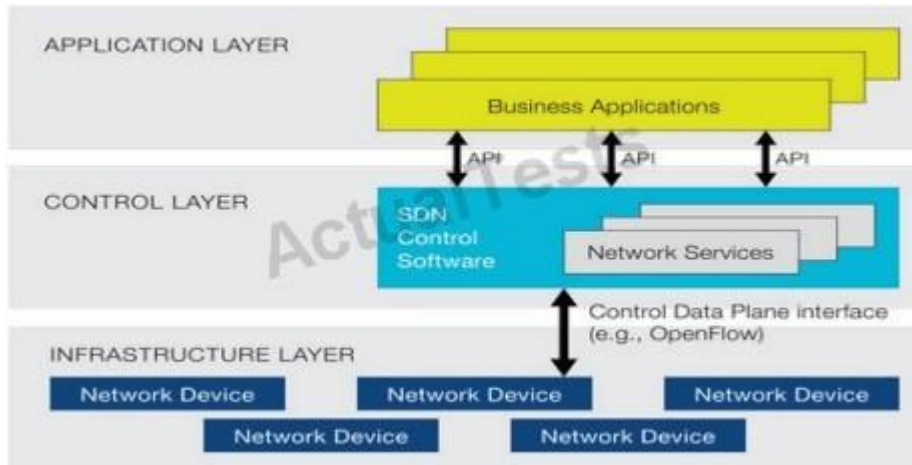
Explanation/Reference:

Explanation: * Northbound API Relative to figure 1 below, the Northbound API is the API that enables communications between the control layer and the application layer (external business applications).

Southbound API

Relative to Figure 1 below, the Southbound API is the API that enables communications between the control layer and the infrastructure layer (OpenFlow).

Figure 1. ONF's SDN architecture



* Putting the region configurations in place in a controller team ensures seamless failover and failback among the configured controllers for the specified network devices in a region. That is, when a master controller experiences a fault, the Role Orchestration Service ensures that a slave controller immediately assumes the master role over the group of network devices to which the

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failed controller was in the master role.

Reference: Technical white paper, Mock RFI for Enterprise SDN Solutions

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 55

Which framework allows for dynamic insertion and removal of applications in an HP VAN SDN Controller?

- A. cURL
- B. JSON
- C. OSI
- D. OSGi

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: OSGi was thus selected to allow elasticity of applications. The applications can be dynamically introduced and dynamically removed from a running environment without having to shut down the whole controller and then restart it. Using a network analogy again, the applications are "hot-swappable".

Reference: HP Virtual Application Networks SDN Controller Technical Solution Guide

<http://www8.hp.com/h20195/v2/GetPDF.aspx%2Fc04219919.pdf> (page 11 and 12)

QUESTION 56

An administrator wants to configure the HP Network Protector SDN Application to allow access to a specific corporate website when a host is quarantined. The DNS response should still be NXDomain for websites such as piratesmustdie.com. What should the administrator configured?

- A. Permit statement on the ACLs that are pushed to the switches
- B. ACL list with the IP address of the website
- C. Ensure that OpenFlow 1.3 is enabled on the switch and that no redirection server address is specified
- D. DNS Response Type to DNS redirection server address

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

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Explanation: Setting policies to quarantine hosts

The application quarantines a host if the host satisfies the quarantine criteria set in the general threshold policy. You can set policies to direct the host to a safe site and access limited resources on the network. To set the general policies, complete the following steps.

1. Select Policies Policy Enforcement Settings.
The Policies/Policy Enforcement Settings page appears.
2. Click the icon to edit the policy enforcement settings.
3. Select Non-existent Domain option to display a message that the domain does not exist.
4. Enter time in seconds in the TTL(sec) text box to cache the response.
5. Select Redirection Server option to redirect the host to a known safe site.
6. Enter the domain name or IP address of the known safe site in the DNS Redirection Server Address text box.
7. Click icon to add the domain name or IP address of the resources that the host can access when it is quarantined.
8. Click icon to save the setting.

Reference: HP Network Protector SDN Application Administrator Guide

QUESTION 57

What are examples of information that the Topology Service returns for an OpenFlow switch port? (Select two.)

- A. Whether the port is a connection point
- B. Whether the port can be used as an observation point
- C. Whether the port has BDDP enabled
- D. Whether the port has LLDP medium endpoint discovery enabled
- E. Whether the port can participate in forwarding mode in a looped topology

Correct Answer: AE

Section: (none)

Explanation

Explanation/Reference:

Explanation:

QUESTION 58

What are advantages of using the HP Network Protector SDN application in a BYOD Network for Malware protection? (Select two.)

- A. To provide updates to filtered host lists
- B. To provide centralized management of client based firewall "Pass Any Exam. Any Time." - www.actualtests.com 43
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- C. To provide full HIPS functionality for BYOD devices
- D. To provide security at the network core to provide prevention before connection

Correct Answer: CD

Section: (none)

Explanation

Explanation/Reference:

Explanation:

You can set general policies for all the hosts in the network to manage and mitigate malicious traffic and host name requests. General policies enable the application to detect changes in network traffic patterns. The general policies prevent the host from acting like a botnet and being controlled by external malicious computers.

When network traffic from a host exceeds the policy limits, you can configure application to perform one of the following actions:

Block

Block and notify

Quarantine

Quarantine and Notify

Note: HIPS

Short for host-based intrusion prevention system, HIPS is an IPS or intrusion prevention system designed for security over host-based systems where intrusions and infections are dealt with at the individual workstation level to provide a more effective level of security.

Reference: HP Network Protector SDN Application Administrator Guide

QUESTION 59

A customer wants to implement an OpenFlow solution where packets that do not match any flow entries in the OpenFlow table on the switch are not sent to the controller. Rather, packets not matching should be handled normally by the switch. Which command enables this functionality on an HP 3800 series switch?

- A. openflow instance sales mode active
- B. openflow instance sales mode normal
- C. openflow instance sales mode passive
- D. openflow instance sales mode hybrid

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow instance mode

OpenFlow can work either in active or passive mode.

Passive mode

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There is one-way communication from the OpenFlow controller to the switch. Packets that do not match any flow in the flow table on the switch are not sent to the controller. Such packets of new flows are handled normally by the switch.

Active mode

New packets of a flow that the switch is not aware of are sent to the OpenFlow controller.

Reference: HP Switch Software OpenFlow Administrator's Guide K/KA/WB 15.14

http://h20628.www2.hp.com/km-ext/kmcsdirect/emr_na-c03991489-1.pdf (OpenFlow instance mode, passive mode)

QUESTION 60

Which table functionality was introduced with OpenFlow 1.3?

- A. ARP
- B. Metering
- C. Flow
- D. Matching

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow version 1.3 is the latest version of OpenFlow that has support from switch vendors. It is significantly different from OpenFlow version 1.0 (which was the previous version several vendors supported). Among others, the main features added since then are:

1.1: Support for MPLS, Q-in-Q, VLANs, multipath, multiple tables, logical ports 1.2: Support for extensible headers (in match, packet_in, set_field), IPv6

1.3: Support for tunneling, per-flow traffic meters, Provider Backbone Bridging

Reference: OpenFlow version 1.3 tutorial

QUESTION 61

Which command is a valid cURL command that can be executed against the HP VAN SDN Controller (assuming variables and scripts are configured correctly)?

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```
A ☐ curl -sk -H "X-Auth-Token:$token" -X POST -H 'Content-Type:application/json' -d
    @0b.json https://192.168.56.7:8443/sdn/v2.0/of/datapaths/00:00:00:00:00:00:00:0b/flows

B ☐ curl -sk -H "X-Auth-Token:$token" /v2.0/of/datapaths

C ☐ curl -sk -H "X-Auth-Token:$token" -X POST -H 'Content-Type:application/json' -d
    @0b.json https://192.168.56.7:8443/sdn/v1.0/of/datapaths/00:00:00:00:00:00:00:0b/flows

D ☒ curl -sk -H -X POST -H 'Content-Type:application/json' -d @0b.json
    https://192.168.56.7:8443/sdn/v2.0/of/datapaths/00:00:00:00:00:00:00:0b/flows
```

A. Option A

B. Option B

C. Option C

D. Option D

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Example: Install an Uploaded (STAGED) Application `curl --noproxy <controller_ip> --header X-Auth-Token:<authentication_token> -ksS --fail --url https://<controller_ip>:<port>/sdn/v2.0/apps/<AppId>/action/ -d install --request POST`

Incorrect

Not B: incomplete command

Not C: Use path /sdn/v2.0/...

Not D: -H host header not specified.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 62

What happens to an incoming packet that does not have a match in any of the Open Flow tables on an HP Provision switch that operates in passive mode?

- A. The packet is forwarded using legacy forwarding mechanisms.
- B. The packet is forwarded to the HP VAN SDN Controller.
- C. The packet is sent to the control plane of the switch.
- D. The packet is dropped.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow instance mode

OpenFlow can work either in active or passive mode.

Passive mode

There is one-way communication from the OpenFlow controller to the switch. Packets that do

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not match any flow in the flow table on the switch are not sent to the controller. Such packets of new flows are handled normally by the switch (that is using legacy forwarding mechanisms).

Active mode

New packets of a flow that the switch is not aware of are sent to the OpenFlow controller.

Reference: HP Switch Software OpenFlow Administrator's Guide K/KA/WB 15.14

QUESTION 63

Two HP OpenFlow switches are connected to an intermediate layer 2 switch running LLDP, but not OpenFlow. This intermediate switch is configured with a single VLAN. Which protocol is used by the OpenFlow switches to discover this multi-hop link?

- A. CDP
- B. ND
- C. LLDP
- D. BDDP

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: The LLDP messages allow the link service to discover that there is physical link between two switches. If the LLDP message on one side of the link (Packet_Out) is received on the other side of the link (Packet_In) by a switch, LS knows that the two switches are connected to each other. The service is also responsible for identifying multi-hop links. These are links where non- OpenFlow devices are connected between two OpenFlow switches and thus separate the OpenFlow switches. The Link Service does this by sending BDDP (Broadcast version of LLDP) messages in addition to LLDP messages. LLDP is a one hop protocol and may be consumed by a non-OpenFlow switch because LLDP uses a multicast address which the intermediate switch may have subscribed to the LLDP multicast. However, a broadcast frame (BDDP) will be forwarded typically by the intermediate switch. BDDP has the same TLV information as LLDP.

Reference: HP SDN Network Services Modules

QUESTION 64

Which component synchronizes the configuration amongst a team of HP VAN SDN Controllers?

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- A. Zookeeper
- B. Cassandra
- C. Virgo
- D. Keystone

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: ZooKeeper is a centralized service for maintaining configuration information, naming, providing distributed synchronization, and providing group services.

Incorrect:

Not Cassandra: Apache Cassandra is an open source distributed database management system designed to handle large amounts of data across many commodity servers, providing high availability with no single point of failure.

Not Keystone: The SDN controller uses Openstack Keystone as an identity management for managing users, generating tokens, as well as token validation.

QUESTION 65

How does an HP VAN SDN Controller team provide high availability for external applications?

- A. By using the southbound controller interface tied to a region configuration
- B. By using the southbound controller interface with a secondary interface
- C. By using the northbound controller interface tied to a region configuration
- D. By using the northbound controller interface with a secondary interface

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: * Northbound API Relative to figure 1 below, the Northbound API is the API that enables communications between the control layer and the application layer (external business applications).

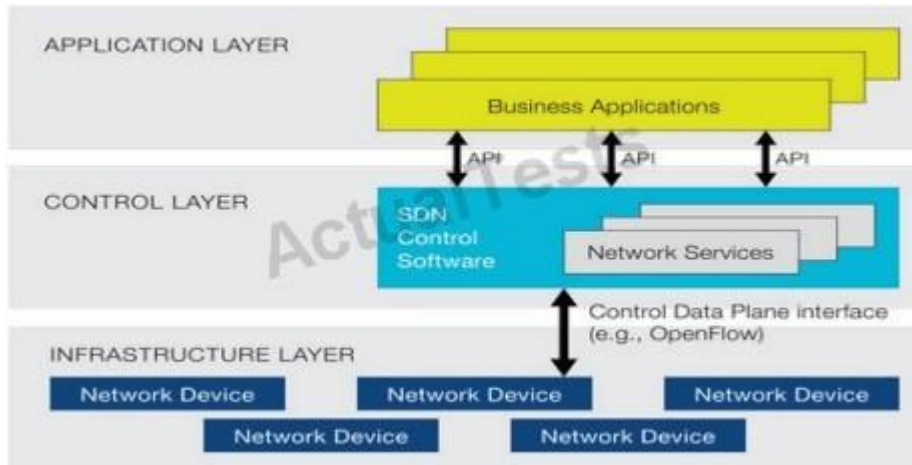
Southbound API

Relative to Figure 1 below, the Southbound API is the API that enables communications between the control layer and the infrastructure layer (OpenFlow).

Figure 1. ONF's SDN architecture

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* Putting the region configurations in place in a controller team ensures seamless failover and failback among the configured controllers for the specified network devices in a region. That is, when a master controller experiences a fault, the Role Orchestration Service ensures that a slave controller immediately assumes the master role over the group of network devices to which the failed controller was in the master role.

Reference: Technical white paper, Mock RFI for Enterprise SDN Solutions

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 66

Which protocol does HP IMC use to communicate with the HP VAN SDN Controllers?

- A. SNMP
- B. TCL
- C. Open Flow
- D. REST

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: IMC uses a REST interface to manage the HP VAN SDN Controller Reference: Technical white paper, Mock RFI for Enterprise SDN Solutions

<http://h20195.www2.hp.com/V2/getpdf.aspx/4AA5-1162ENW.pdf> (page 5)

QUESTION 67

Which modes does the 2.0 release of the HP VAN SDN Controller support? (Select two.)

- A. Multi active master
- B. Dual homed
- C. Clustered
- D. Team
- E. Standalone

Correct Answer: DE

Section: (none)

Explanation

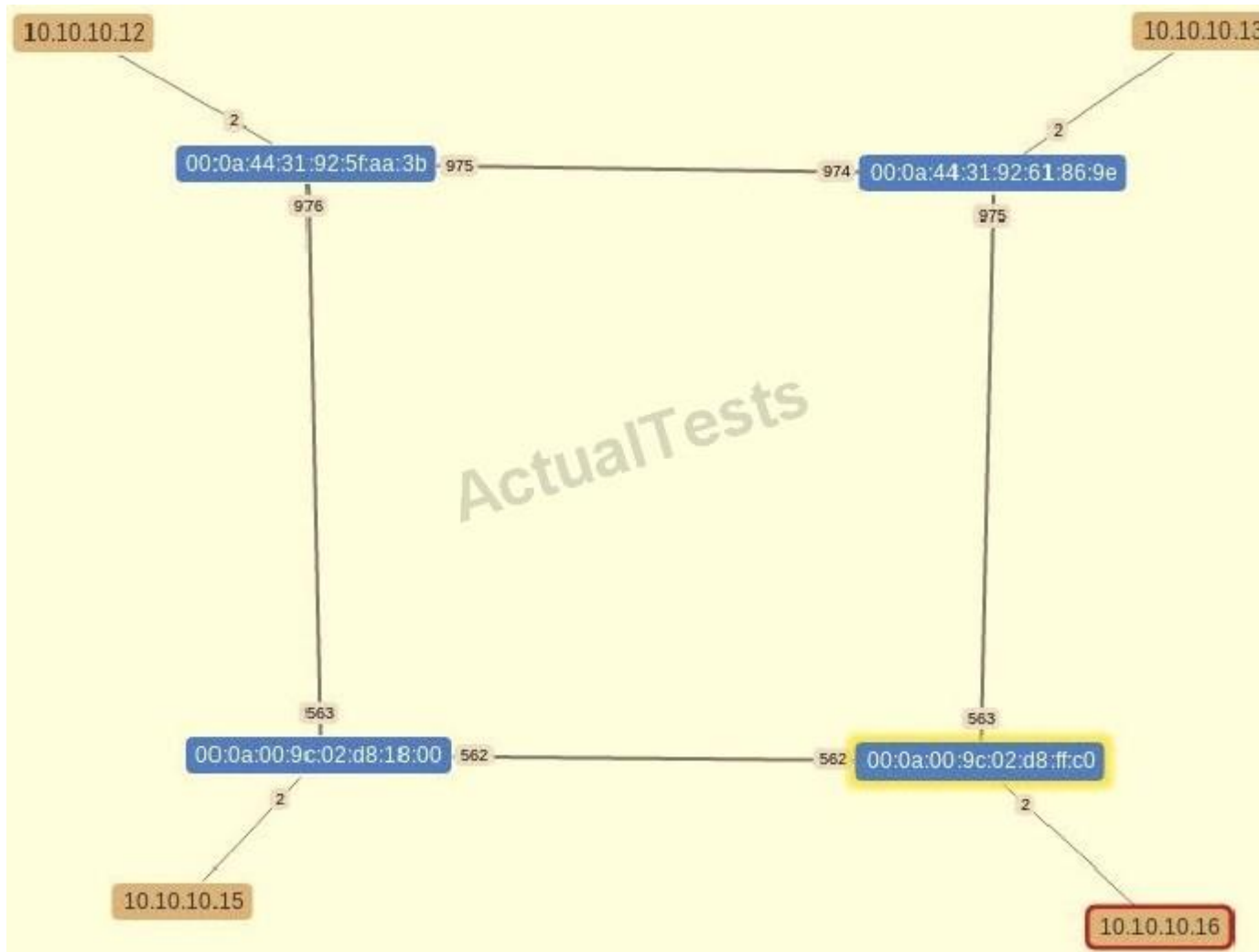
Explanation/Reference:

Explanation: The HP VAN SDN Controller Administrator Guide describes the configuration and management of the HP VAN Controller in standalone and team modes.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 68

Refer to the exhibit.



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The switches in the diagram are connected to each other using two physical cables. The network consists of two HP 3800 series switches and two HP 5900 series switches. Why is only one link displayed between switches in the OpenFlow Topology diagram on the HP VAN SDN Controller?

- A. The SPF algorithm used by the HP VAN SDN Controller only supports a single link between switches and blocks other links to stop loops. The HP VAN SDN Controller only displays the single active link between the switches

- B. Link aggregation is being used OpenFlow only displays information about the logical interface and not the physical interfaces. The HP VAN SDN Controller only displays a single link between switches
- C. Link aggregation is being used. One of the Interfaces in the bundle is down, and OpenFlow has updated the HP VAN SDN Controller with this information The HP VAN SDN Controller only displays the active link in the OpenFlow Topology diagram
- D. Spanning tree is blocking one of the ports. The HP VAN SDN Controller. Only displays the active link in the OpenFlow Topology diagram.

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Note: TopologyViewer

Creates and updates a network graph for visualizing the network the controller discovers. The Topology Viewer uses the services of the Topology Manager and Link Manager.

QUESTION 69

Which protocol does the LYNC FE Server Plugin use to communicate to the HP Network Optimizer SDN Application?

- A. OpenFlow
- B. SNMPv3
- C. Java Remote Method Protocol
- D. REST

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Net Optimizer - Lync uses OpenFlow to dynamically provision the end-to-end network path and QoS policy for that Lync call.

Reference: HP Network Optimizer SDN Application -Microsoft Lync 1.1 Administrator Guide

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QUESTION 70

What are internal applications that are included with the HP VAN SDN Controller? (Select three.)

- A. Capacity Planner
- B. OpenFlow Daemon
- C. Topology Manager
- D. Node Manager
- E. Path Daemon
- F. Time Daemon

Correct Answer: CDE

Section: (none)

Explanation

Explanation/Reference:

Explanation: The HP VAN SDN Controller ships with a default set of core network service components, which provide an out-of-box experience in terms of enabling connectivity across network applications in the Openflow network.

They include:

Topology Manager

Node Manager

Path Daemon

OpenFlow Node Discovery

Link Manager

OpenFlow Link Discovery

Reference: HP VAN SDN Controller Programming Guide

QUESTION 71

An administrator wants to increase the number of log files held by the HP VAN SDN Controller. What would the administrator need to do to change this?

- A. Modify the /opt/sdn/virgo/configuration/serviceability.xml configuration file.
- B. Log in to the Virgo console and change the logging settings.
- C. Adjust the logging setting via the Support Logs web interface.
- D. Modify the /opt/sdn/virgo/bin/dmk.sh script.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: The Support Logs function automatically maintains an internal record of events of interest from the operations of an active SDN controller.

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Configure the Support Log for Queue Size

The default queue size is 100 lines. To configure a different queue size, change the value for the max.display.rows key in the adm.log.impl.LogManager Configurations component.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 72

Refer to the exhibit.

Flows for Data Path ID: 00:0a:00:9c:02:d8:18:00						Summary	Ports	Flows	Groups
Table ID	Priority	Packets	Bytes	Matches	Actions/Instructions				
▸ 0	0	0	0		goto_table: 100				
▸ 100	0	157693	0		goto_table: 200				
▸ 100	29999	721	0	in_port: 4 eth_dst: 00:0c:29:24:53:3e eth_src: 00:0c:29:15:20:e6 eth_type: arp	apply_actions: output: 2				
▸ 100	29999	723	0	in_port: 2 eth_dst: 00:0c:29:15:20:e6 eth_src: 00:0c:29:24:53:3e eth_type: arp	apply_actions: output: 4				
▸ 100	29999	28740	0	in_port: 2 eth_dst: 00:0c:29:15:20:e6 eth_src: 00:0c:29:24:53:3e eth_type: ipv4	apply_actions: output: 4				
▸ 100	29999	28739	0	in_port: 4 eth_dst: 00:0c:29:24:53:3e eth_src: 00:0c:29:15:20:e6 eth_type: ipv4	apply_actions: output: 2				
▸ 200	0	154712	9982515		apply_actions: output: 4294967293				

Which version of OpenFlow has the switch shown in the exhibit with DPID 00 0a:00 9c 02:d8 18:00 negotiated to use with the HP VAN SDN Controller version 2.0?

- A. 1.0.0
- B. 1.3.0
- C. 1.5.0
- D. 1.6.0

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: * The HP VAN controller supports the following:
Versions 1.0 and 1.3 of OpenFlow on HPN ProVision and Comware switches

* Openflow 1.3.1: Support for multiple flow tables is introduced

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Reference: Open Flow 1.3.1 Support: Controller View

QUESTION 73

Refer to the exhibit.

New Application

C:\fakepath\App1.zip **Browse**

Unsigned jars **Upload**

Name:

Version:

ID:

Deploy

Cancel

A network administrator is trying to install a new internal application on the HP VAN SDN Controller and receives the error shown in the exhibit. Which valid options are available to ensure that the application is installed successfully? (Select two.)

- A. Set up an internal CA server and digitally sign the application. This will be accepted by the HP VAN SDN Controller without further configuration.
- B. Use the HP VAN SDN Controller software to digitally sign the application
- C. Modify the /opt/sdn/virgo/configuration/serviceability .xml configuration file and include this line:
Dsdn signedJar=none
- D. Modify the /opt/sdn/virgo/bin/dmk sh script and include this line: Dsdn.signedJar=none
- E. Ensure the application is signed by a CA recognized by the HP VAN SDN Controller.

Correct Answer: BD

Section: (none)

Explanation

Explanation/Reference:

Explanation: D_ The SDN controller enforces jar-signing validation by default. For an

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experimental/development environment where unsigned applications need to be deployed, jar- signing validation can be turned off altogether:

Stop the SDN controller:

```
sudo service sdnc stop
```

2. Modify the /opt/sdn/virgo/bin/dmk.sh script to include the line "-Dsdn.signedJar=none \"

3. Start the SDN controller:

```
sudo service sdnc start
```

B: Adding Certificates to Jar-Signing Truststore

To deploy other signed applications onto the controller, use the Java keytool to import the public certificate that was used to sign the application jars into the controller jar-signing truststore (/opt/sdn/admin/sdnjar_trust.jks):

```
keytool -importcert -keystore /opt/sdn/admin/sdnjar_trust.jks -file signed_app.cer -alias mysignedcert
```

The controller needs to be restarted for the new truststore to take effect.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 74

Which component of OpenStack is used by the HP VAN SDN Controller for identity services?

- A. Glance
- B. Keystone
- C. Swift
- D. Horizon

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: The SDN controller uses Openstack Keystone as an identity management for managing users, generating tokens, as well as token validation.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 75

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What is a key advantage of implementing malware protection by using the HP Network Protector SDN application?

- A. To provide central management of antivirus software

- B. To provide rule-based access control
- C. To provide VLAN assignment without supplicant
- D. To provide clientless operation

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation: About VLAN group policies

Policies are a collection of filters or rules that provide a method for setting up security configuration options for VLAN groups. You can create customized policies for each VLAN group based on the requirements and the threat type for each group.

You can customize the policies for the groups by setting the reputation scores. You can set up policies for each group to protect your network from the following threat types:

Botnet, Malware, etc

Reference: HP Network Protector SDN Application Administrator Guide

QUESTION 76

An administrator has created a whitelist entry for the website www.piratesmustdie.com. This has been applied to the test group, which contains VLANs 10-20. VLANs 1 - 20 are configured on switches in the network. A time range has been applied to the whitelist for the time period 9:00am to 5:00pm.

Which users would be able to access the website?

- A. The website is blocked for all users because it has a reputation score of 80 in the RepDV database
- B. Users in VLAN 10 will be able to access the website at 10:00am.
- C. All users will be able to access the website at 4:00pm.
- D. Users in VLAN 5 will be able to access the website at 11:00pm.

Correct Answer: B

Section: (none)

Explanation

Explanation/Reference:

Explanation:

QUESTION 77

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Refer to the exhibit.

Mode	: Active
Flow Location	: Hardware and Software
No. of Hw Flows	: 6
No. of Sw Flows	: 1
Hw. Rate Limit	: 0 kbps
Sw. Rate Limit	: 100 pps
Conn. Interrupt Mode	: Fail-Secure
Maximum Backoff Interval	: 60 seconds
Probe Interval	: 10 seconds
Hw. Table Miss Count	: NA
No. of Sw Flow Tables	: 1
Egress Only Ports	: None
Table Model	: Policy Engine and Software

A network engineer wants to use dpctl to make flow modifications directly on an HP 3800 switch flow table. Can the engineer make the changes using dpctl on the switch in the exhibit?

- A. The engineer is unable to connect to the switch directly. Dpctl requires OpenFlow 1.0, and the switch is currently configured to use OpenFlow 1.3.
- B. The engineer is able to connect to the switch directly using dpctl, but is unable to use dpctl to update the flow entries on the switch. Ovs-ofctl is required to make flow modifications when using OpenFlow 1.3.
- C. The engineer is able to connect to the switch directly using dpctl. The engineer will then need to use the correct OpenFlow 1.3 syntax to make flow modifications using dpctl.
- D. The engineer is unable to connect to the switch directly. Once the correct configuration is completed on the switch, the engineer will be able to connect directly and then use the correct OpenFlow 1.3 syntax to make flow modifications using dpctl.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: dpctl

The HP supports a passive listening port per OpenFlow instance. This is super-useful when you want to debug an individual switch without going through the controller.

Add a listener port:

openflow listener ptcp:6633
Then use dpctl. Examples:

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```
dpctl dump-tables tcp:<switch>:<port>
dpctl dump-flows tcp:<switch>:<port>
dpctl add-flow tcp:<switch>:<port> 'in_port=104 actions=output:98'
```

QUESTION 78

What are the OpenFlow flow entry timeout values? (Select two.)

- A. Flow timeout
- B. Idle timeout
- C. Soft timeout
- D. Controller timeout
- E. Hard timeout

Correct Answer: BE

Section: (none)

Explanation

Explanation/Reference:

Explanation: OpenFlow flow entry timers include the idle timeout, the hard timeout, and the purge flow timer.

Reference: Understanding OpenFlow Flow Entry Timers on Devices Running Junos OS

http://www.juniper.net/techpubs/en_US/junos13.3/topics/concept/junos-sdn-openflow-flow-entry-timers-overview.html

QUESTION 79

Refer to the exhibit.

```
<5900-1>display openflow instance 10 flow-table
Flow entry 17 information:
  cookie: 0x0, priority: 30000, hard time: 0, idle time: 60, flags: none,
  byte count: --, packet count: 23542
Match information:
  Ethernet type: 0x0800
  IPv4 source address: 10.10.10.0, mask: 255.255.255.0
  IPv4 destination address: 192.168.56.0, mask: 255.255.255.0
Instruction information:
  Write actions:
    Output interface: Normal
```

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A customer has configured a VLAN to use OpenFlow. An HP Comware switch is used and configured to communicate with an HP VAN SDN Controller version 2.0. How was the flow entry in the exhibit added to the flow table of the switch?

- A. An application added the flow entry by making an API call against the southbound OpenFlow API of the HP VAN SDN Controller.
- B. The HP VAN SDN Controller topology service added this flow entry to the switch's flow table
- C. The HP VAN SDN Controller link discovery service added this flow entry to the switch's flow table
- D. An application added the flow entry by making an API call against the northbound REST API or JAVA API of the HP VAN SDN Controller.

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation:

Incorrect:

Not A: Southbound API is not used by external Applications.

Not B:

Topology service to create a network graph and compute the shortest path between two hosts.

Not C:

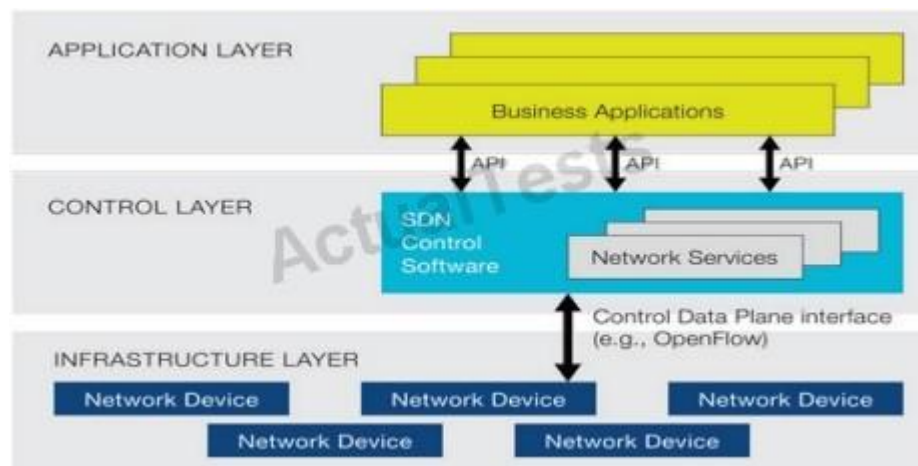
The link discovery service is responsible for discovering and maintaining the status of links in the OpenFlow network. The link discovery would record Mac Addresses, not IP addresses.

* Northbound API Relative to figure 1 below, the Northbound API is the API that enables communications between the control layer and the application layer (external business applications).

Southbound API

Relative to Figure 1 below, the Southbound API is the API that enables communications between the control layer and the infrastructure layer (OpenFlow).

Figure 1. ONF's SDN architecture



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* Putting the region configurations in place in a controller team ensures seamless failover and failback among the configured controllers for the specified network devices in a region. That is, when a master controller experiences a fault, the Role Orchestration Service ensures that a slave controller immediately assumes the master role over the group of network devices to which the failed controller was in the master role.

Reference: Technical white paper, Mock RFI for Enterprise SDN Solutions

Reference: HP VAN SDN Controller Administrator Guide

Note:

* The exhibit shows that the IPv4 source address, 10.10.10.0 is a private network.

The exhibit shows that the IPv4 destination address, 192.168.56.0 is also a private network.

* display openflow instance instance-id flow-table [table-id]

Display flow table entries for an OpenFlow instance.

QUESTION 80

A multicast application is used in a customer's environment that relies on IGMP. On an edge switch an Openflow 1.3 instance is configured in aggregation mode. By default, what happens to the IGMP traffic if no matching flow entry exists?

- A. IGMP traffic is forwarded on the data plane.
- B. IGMP traffic is forwarded to the SON Controller.
- C. IGMP traffic is dropped.
- D. IGMP traffic is forwarded on the control plane.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: In Aggregation mode, all VLANs in the switch are part of an OpenFlow instance. When Aggregation is configured, there is only OpenFlow traffic, no production traffic.

Reference: HP OpenFlow 1.3 Administrator Guide, Wired Switches K/KA/KB/WB 15.15

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QUESTION 81

Which protocol is used for link discovery when OpenFlow switches are separated by a non- OpenFlow switch?

- A. BDDP
- B. RSTP
- C. LLDP
- D. LACP

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: LLDP is used to discover direct links between switches and BDDP is used to discover the switches in the same broadcast domain.

Note: Using a link-discovery module, the controller generates both LLDP and broadcast packets (referred to as BDDPs) and sends them to all neighboring switches on a regular basis.

Reference: OpenFlow Controller

QUESTION 82

Refer to the exhibit.



The topology shown in the exhibit has the following characteristics:

- * The Open Flow enabled switches are running in virtualization mode with member VLAN 10

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- * All the switches in the topology share the same VLANs.

- * All the VLANs are tagged on all the links.
- * Each OpenFlow domain is controlled by its own controller and is making independent decisions
- * Every switch within the topology has PVST enabled only on VLAN 10

The networking team implementing OpenFlow reports that there are communication problems between the OpenFlow domains. What could be the cause of this communication problem?

- A. This is an unsupported topology.
- B. OpenFlow requires a dedicated out-of-band management network
- C. OpenFlow networks that communicate must use different VLANs.
- D. A loop has been formed.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Virtualization mode

With Virtualization Mode, some VLANs can be designated as members of OpenFlow instances. Each OpenFlow instance is independent and has its own OpenFlow configuratio

Note: OpenFlow can be configured for Virtualization Mode or Aggregation Mode.

* Virtualization Mode

Each OpenFlow instance is independent and has its own OpenFlow configuration and OpenFlow controller connection. Some VLANs are designated as members of OpenFlow instances while other VLANs are not. The VLANs that are not members of OpenFlow instances could be thought of as VLANs carrying production traffic.

* Aggregation Mode

Provides a single OpenFlow instance that includes all of the VLANs configured on the switch except the VLAN(s) that connect to the controller(s) and the Management VLAN on the switch.

Production traffic is not allowed

Reference: HP OpenFlow Switches Administrator's Guide

QUESTION 83

Which HP IMC SDN Manager functionally provides a detailed overview of flow entry history?

- A. SDN Manager service flow management
- B. SDN Manager Open Flow device management
- C. SDN Manager dashboard

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D. SDN Manager flow entry management

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: Flow Management:

- * Delivers History Flow Entry records flow entry used before to help administrators audit flow policy change
- * Displays the list of all current Flow entry in OF network, including Match Field, Instruction and other statistics.
- * Shows detailed flow service information and flow traffic and trend in flow entry detail page
- * Provides shortcut to locate flow to topology show device and link status

Reference: HP IMC Virtual Application Networks Software-defined Networking Manager Software

QUESTION 84

Which services does HP IMC SDN Manager provide? (Select two.)

- A. Managing switch listeners
- B. Updating Topology Service discovery protocol
- C. Managing OpenFlow enabled SDN resources
- D. Creating and maintaining flow policies
- E. Managing and maintaining application awareness

Correct Answer: CD

Section: (none)

Explanation

Explanation/Reference:

Explanation: * HP VAN SDN Manager provides the following:

/ Consistent management experience across SDN and traditional networks / Configuration, monitoring, and policy management for a software-defined network / OpenFlow switch management for quick troubleshooting and deployment

* SDN management

HP Provides a complete SDN management solution that:

/ Delivers network agility through rapid provisioning and automation of network policy enforcement and enabling SDN deployments.

/ Accelerates application deployment through rapid provisioning of server connectivity. / Enables service agility and velocity from access to core through network resource provisioning. / Provides comprehensive management of all SDN layers.

Reference: Mock RFI for Enterprise SDN Solutions

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QUESTION 85

Which switches will initiate an OpenFlow connection to the HP VAN SDN Controller? (Select two.)

- A. Option A
- B. Option B
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- C. Option C
- D. Option D
- E. Option E

Correct Answer: CE

Section: (none)

Explanation

Explanation/Reference:

Explanation: You must enable openflow.

Enable/disable Openflow:

```
openflow <vlan_id> {enable/disable}
```

Note:

Openflow Configuration (required)

Once you've set up a VLAN, you need to enable and configure an OpenFlow instance on that VLAN.

Show the set of configured OpenFlow instances:

```
show openflow
```

Enter the VLAN for the instance you'd like to configure:

```
vlan <vlan_id>
```

Show the Openflow configuration, including configurable state, controller connectivity, and switch MAC addr:

```
show openflow <vlan_id>
```

Set the controller string (6633 is NOX's default port):

```
openflow <vlan_id> controller tcp:<ip_addr>:<tcp_port> Enable/disable Openflow:
```

openflow <vlan_id> {enable/disable}

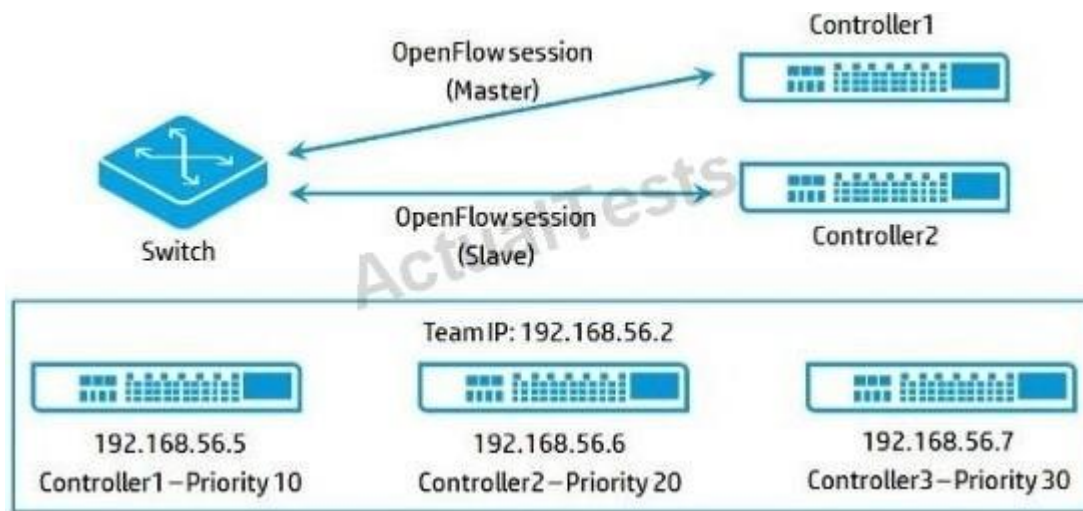
Reference: Configuring HP Procurve

http://archive.openflow.org/wk/index.php/Configuring_HP_Procurve

QUESTION 86

Refer to the exhibit.

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A team of HP VAN SDN Controllers has been configured. In addition, regions have been configured. The switch shown in the exhibit has two OpenFlow sessions as follows:

Controller1 - Master

Controller2 - Slave

Controller1 is rebooted

What happens?

A. The role orchestration service detects Controller1 failure, and Controller2 becomes the master.

Once Controller1 rejoins the team, it becomes the master, and Controller2 reverts to being the slave.

- B. The role orchestration service detects Controller1 failure, and Controller2 becomes the master.
Once Controller1 rejoins the team, it joins as the slave controller.
- C. The role orchestration service detects Controller1 failure. Controller2 becomes the master, and Controller1 becomes the slave. Once Controller1 rejoins the team. It joins as the master and Controller2 becomes the slave.
- D. The role orchestration service detects Controller1 failure. Controller2 becomes the master and Controller1 becomes the slave. Once Controller1 rejoins the team it no longer communicates with the switch.

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: * Failover (step 1)

ROS (role orchestration service) triggers the failover operation in two cases:

/ Controller failure:

/ Device disconnect:

The ROS instance in a controller is notified of a communication failure with network device(s) through the Controller Service notifications. It instantly communicates with all ROS instances in

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the team to determine if the network device(s) in question are still connected to any of the backup (slave) controllers within the team. If that is the case, it elects one of the slaves to assume the master role over the affected network device(s).

* Failback (step 2)

When the configured master recovers from a failure and rejoins the team, or when the connection from the disconnected device(s) with the original master is resumed, ROS initiates a failback operation in which the master role is restored to the configured master as defined in the region definition.

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 87

Which Open Flow plane is responsible for forwarding the packets?

- A. Control plane
- B. Application plane
- C. Management plane
- D. Data plane

Correct Answer: D

Section: (none)

Explanation

Explanation/Reference:

Explanation: The forwarding table is delivered to the data plane by the management plane as part of the device operating system. Thus when an Ethernet frame arrives on the switch interface, the data plane then forwards it to output port.

Note: OpenFlow defines a standard for sending flow rules to network devices so that the Control Plane can add them to the forwarding table for the Data Plane.

Incorrect:

Not A: The control plane will use the routing table to build the forwarding table used by data plane. Not C: The Management Plane handles functions such device management, firmware updates, SNMP and external configuration via the CLI.

Reference: OpenFlow and Software Defined Networking: Is it Routing or Switching ?

QUESTION 88

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A company has video, voice, and collaboration applications. The company is looking for a solution that improves performance. Which benefit does software-defined networking (SDN) provide for this company?

- A. SDN establishes a loop-free, non-baking architecture using Transparent interconnection of Lots of Links (TRILL) or Shortest Path Bridging (SPF3), as the company chooses.
- B. SDN applications can automate the scripting of CLI commands- that adjust QoS policies as necessary
- C. SDN applications can determine which traffic flows require prioritization and then program the infrastructure to prioritize these flows.
- D. SDN adds three additional priority classes, specific to voice, video and collaboration, in addition to the eight classes provided by traditional QoS mechanisms.

Correct Answer: C

Section: (none)

Explanation

Explanation/Reference:

Explanation: Unified Communications and Collaboration (UC&C) SDN Application--This application aims to improve the user experience of products such as Microsoft Lync within campus networks. It automates the deployment of quality-of-service policies and dynamically adjusts network priorities to securely support voice, video, and collaboration traffic, even in an environment integrating soft phones and BYOD user endpoints.

Reference: HP Virtual Application Networks SDN Controller

QUESTION 89

Refer to the exhibit.

User	Occurred	Activity	Data	Origin	Controller ID
sdn	today 07:29:54	Start	Topology Viewer has been started	Application Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	today 07:29:48	Stop	Topology Viewer has been stopped	Application Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-14 22:31:02	Start	Node Manager has been started	Application Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-14 22:29:45	Stop	Node Manager has been stopped	Application Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:18:33	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:17:54	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:16:06	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:14:09	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:12:24	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...
sdn	2014-02-05 12:11:24	Download	sdn_controller_backup_2014-02-05_03:5...	Backup Management	d0152bbe-d3e1-4170-a7ec-db0...

Which HP VAN SDN Controller feature displays the output in the exhibit?

- A. Audit Log
- B. OpenFlow Monitor
- C. Support Log
- D. Alerts

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Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation: For example, the audit log displays software license and teaming activity:

General / Audit Log			
Refresh			
User	Occurred	Activity	Data
sdn-service-client	2013-10-28 17:23:17	Added a license	License Serial Number:197 License ...
sdn-service-client	2013-10-28 17:18:30	Added a license	License Serial Number:196 License ...
sdn-service-client	2013-10-28 17:07:18	Uninstalled a license	License Serial Number:194 License ...
sdn-service-client	2013-10-28 15:23:08	Uninstalled a license	License Serial Number:195 License ...
TeamConfig	2013-10-28 15:05:00	Team created	name: 3Member Ip: 15.146.193.86 ...
TeamConfig	2013-10-28 13:32:37	Team deleted	
TeamConfig	2013-10-28 13:23:19	Team created	name: 3Member Ip: 15.146.193.86 ...
sdn-service-client	2013-10-28 12:46:39	Added a license	License Serial Number:195 License ...
sdn-service-client	2013-10-28 12:32:35	Modified	Modified config: com.hp.sdn.ctlnod...
sdn-service-client	2013-10-26 06:20:36	Updated a license with new quantity	License Serial Number:194 License ...
sdn-service-client	2013-10-26 06:11:53	Added a license	License Serial Number:194 License ...
sdn-service-client	2013-03-27 21:31:01	Added a license	License Serial Number:197 License ...
sdn-service-client	2013-03-27 21:26:14	Added a license	License Serial Number:196 License ...
sdn-service-client	2013-03-27 21:15:02	Uninstalled a license	License Serial Number:194 License ...
sdn-service-client	2013-03-27 19:30:53	Uninstalled a license	License Serial Number:195 License ...

Reference: HP VAN SDN Controller Administrator Guide

QUESTION 90

How does an HP Provision OpenFlow device treat packets received on a port blocked by Spanning Tree Protocol?

- A. Packets are submitted to the OpenFlow pipeline for processing.
- B. Packets are not submitted to the OpenFlow pipeline for processing.
- C. BPDU frames are submitted to The OpenFlow pipeline for processing.
- D. All Layer 2 frames are submitted to the controller for processing

Correct Answer: A

Section: (none)

Explanation

Explanation/Reference:

Explanation:

* Can STP and OpenFlow be used together?

No. They are mutually exclusive. On a Hybrid switch STP is turned off on the OpenFlow VLAN. A recommendation is to enable STP on non-OpenFlow VLANs, but disable on the OpenFlow VLANs. This is safer than disabling STP globally on the switch.

* Do not allow a loop between the OpenFlow and non-OpenFlow portions of your network unless you enable Spanning Tree Protocol on the non OpenFlow devices operating in the network.

* There are two types of OpenFlow switches:

- OpenFlow-only
- OpenFlow-hybrid

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OpenFlow only switches support only OpenFlow operation. All packets are processed using OpenFlow. There is no other way to process packets. OpenFlow hybrid switches support both OpenFlow operation and normal Ethernet switching operation.

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